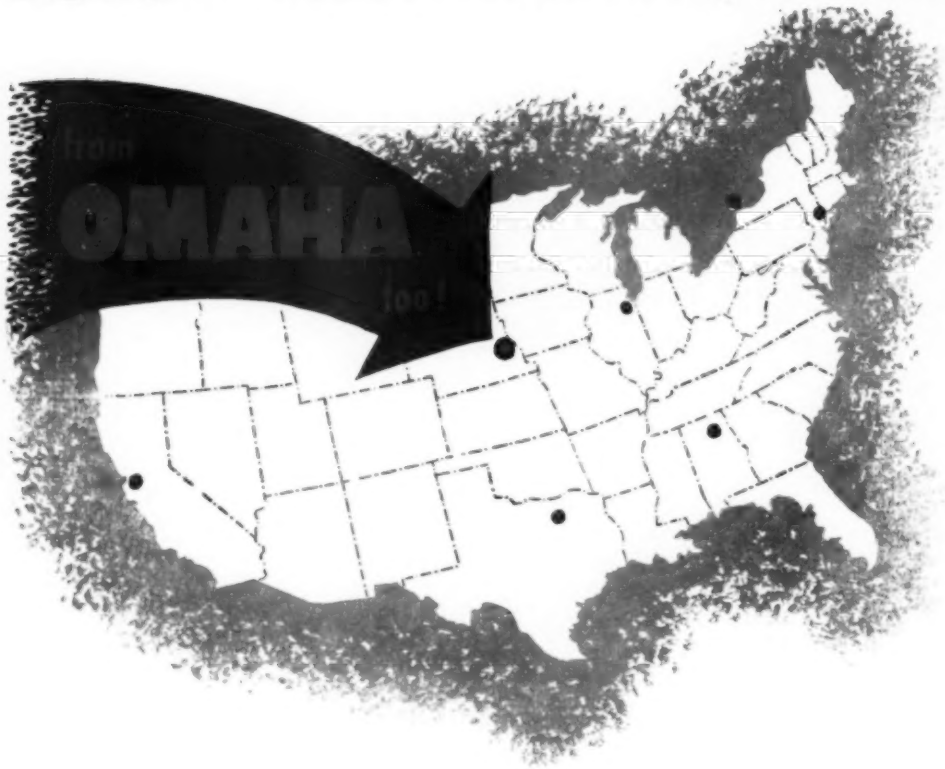
Vol. 7, No. 2 MARCH, 1952

AGRICULTURAL CHEMICALS

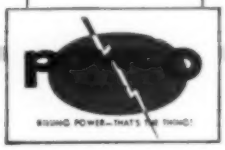
In This Issue:

Tracing Fertilizer in Corn • Story of "Krilium" • Cotton States A.A.E.S. Meets • Southern Weed Conference Herbicides Control Woody Plants • Soil Use of Insecticides • A. C. Article Index for 1951 • Shade Tree Meeting North Central Branch, A.A.E.S. Program • Thirty-Five Years of Entomology • Fertilizer Conditioners, (Part II)

Look to Powell ... for Faster Spot Deliveries



DDT
TOXAPHENE
BHC
CHLORDANE
LINDANE
ROTENONE
SABADILLA
PYRETHRUM & PYRIN
PIPERONYL BUTOXIDE
ALLETHRIN
ANTU
TEPP
PARATHION
ALDRIN
2,4-D & 2,4,5-T



Our nationwide manufacturing and distribution facilities now include Omaha—provide *stocks on the spot* across the continent for faster delivery to *your* plant.

As with our other plants, Omaha is equipped for regional needs—in this case, with special facilities for manufacturing Parathion, DDT and 2,4-D formulations.

Such on-the-spot facilities assure swift, even overnight deliveries... another reason why it pays to "look to Powell!"

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Increased production of food is a vital part of the preparedness pattern. It is essential every acre be used and make its contribution to the overall needs.

Grasslands possess a great potential for increased food production and the Green Pastures program offers the greatest chance of achieving the desired results.

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Carlsbad, New Mexico

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Why is Attaclay first choice from formulation to field?

Fourth of a series designed to tell the story of the pesticide industry's leading carrier and diluent.

Nothing plagues the manufacturer (and user) of dust bases, wettable powders or finished dusts like stickiness . . . heaviness . . . lumpiness. One of the best ways to avoid these vexations is to use a carrier and diluent which has proved its ability to meet the situation head on, and across the board—dependable Attaclay.

Mainly because it delivers maximum flowability

In the Primary Processors Plant

- Attaclay, as received, possesses great natural fluidity.
- Its edge in sorptive capacity eases grinding operations with low melting point solids—permits one-step grinding of solids in combination—is a "natural" for direct impregnation of liquid chemicals—takes all these in stride and delivers dry, free-flowing, premium-grade bases.
- Attaclay keeps dusts *on the move* through conveyors, hoppers, chutes and bagging equipment.

In the Blenders Plant

- The more flowable a base, the better the end product. Blenders are ahead of the game from the start if they standardize on Attaclay-formulated bases.
- When used as diluent or conditioner, Attaclay can help up-grade the flowability of any product.

In the Field

- Free-flowing, Attaclay-based wettable powders disperse more readily and suspend more effectively in spray tanks.
- Attaclay-mixed dusts are noted for their ability to flow, disperse, settle, cover, stick and kill.

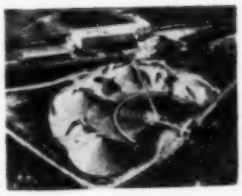
Our suggestion: put Attaclay on your first team and forget flowability problems. May we work with you?

ATTAPULGUS CLAY COMPANY

Dept. P, 210 West Washington Square, Phila. 5, Pa.

JUST OFF PRESS—the second booklet in a newly-inaugurated series called Attaclay Pesticide Digest. These bulletins will discuss various aspects of pesticide processing. A brief note will bring your copy, and future Digests as published.

AGRICULTURAL CHEMICALS



THIS MONTH'S COVER:

New type of phosphate storage system installed by American Cyanamid Co. at Brewster, Fla. Rock is brought in from nearby mines, emptied into track hopper and conveyed up 80' high stacker which pivots in a semi-circle, thus distributing various grades of rock to appropriate piles.

VOL. VII No. 3

MARCH 1952

A Monthly Magazine For the Trade

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LAWRENCE A. LONG
Editor

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AGRICULTURAL CHEMICALS

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Entered as second-class matter November 4, 1949, at the Post Office at Baltimore, Md., under the Act of March 3, 1879.

Virginia strawberry grower

Maine potato grower

California vegetable grower

Arizona vegetable grower

Oklahoma wheat grower

Minnesota corn grower

NO MATTER WHAT YOU GROW....

Tennessee tobacco grower

California citrus grower

Georgia pecan grower

New Jersey bean grower

New York vegetable grower

NO MATTER WHERE YOU GROW IT....

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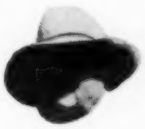
TYPES OF INSECTS ON A BROADER RANGE

OF CROPS THAN ANY OTHER INSECTICIDE

Consult your local agricultural authorities on the advantages of PARATHION insecticides or write for Parathion Grower's Handbook.

Oregon pear grower



South Carolina peach grower

AMERICAN Cyanamid COMPANY

Manufacturer of *Thiophos*® Parathion Technical

Agricultural Chemicals Division

30 Rockefeller Plaza, New York 20, N. Y.

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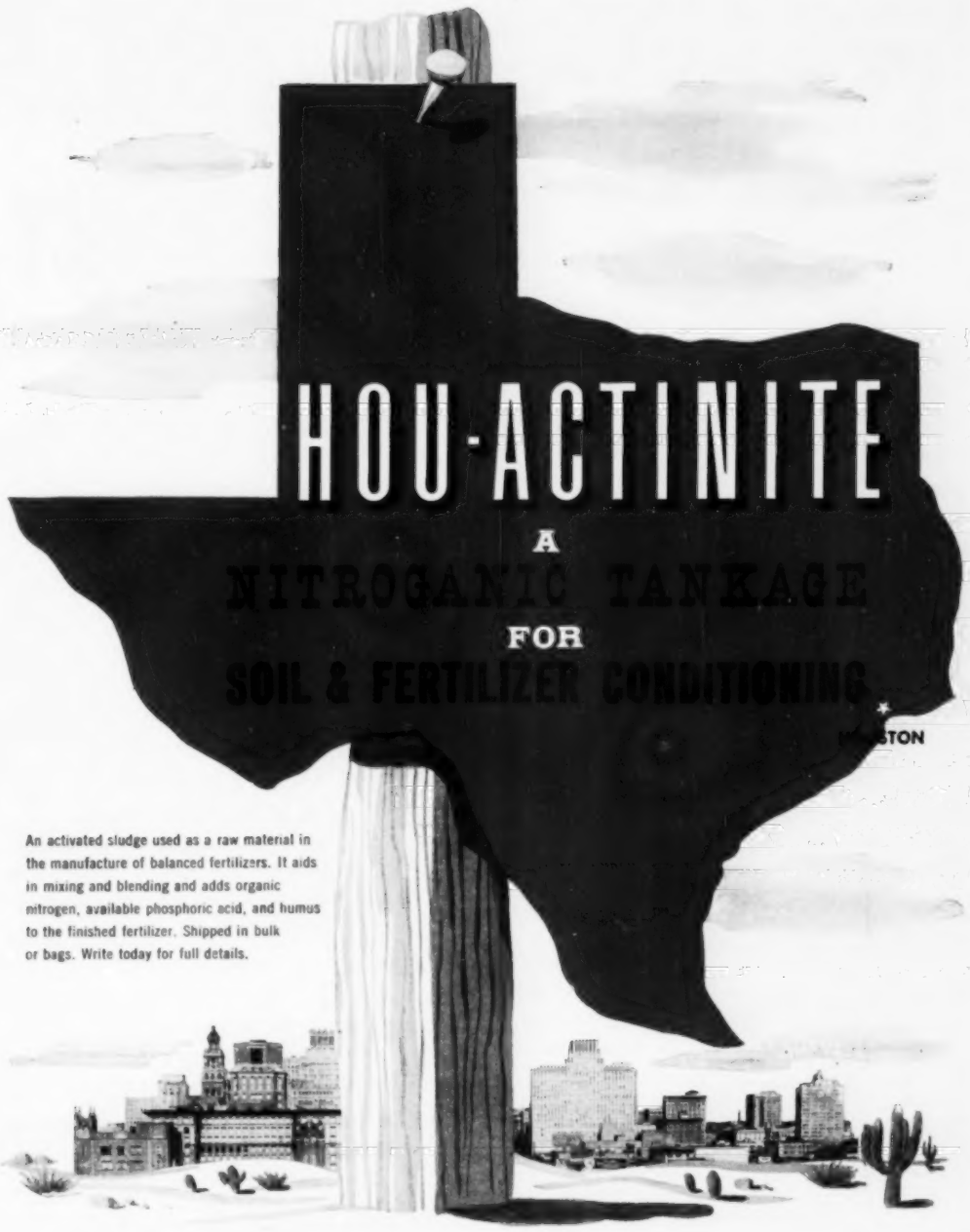
FOR

SOIL & FERTILIZER CONDITIONING



An activated sludge used as a raw material in the manufacture of balanced fertilizers. It aids in mixing and blending and adds organic nitrogen, available phosphoric acid, and humus to the finished fertilizer. Shipped in bulk or bags. Write today for full details.

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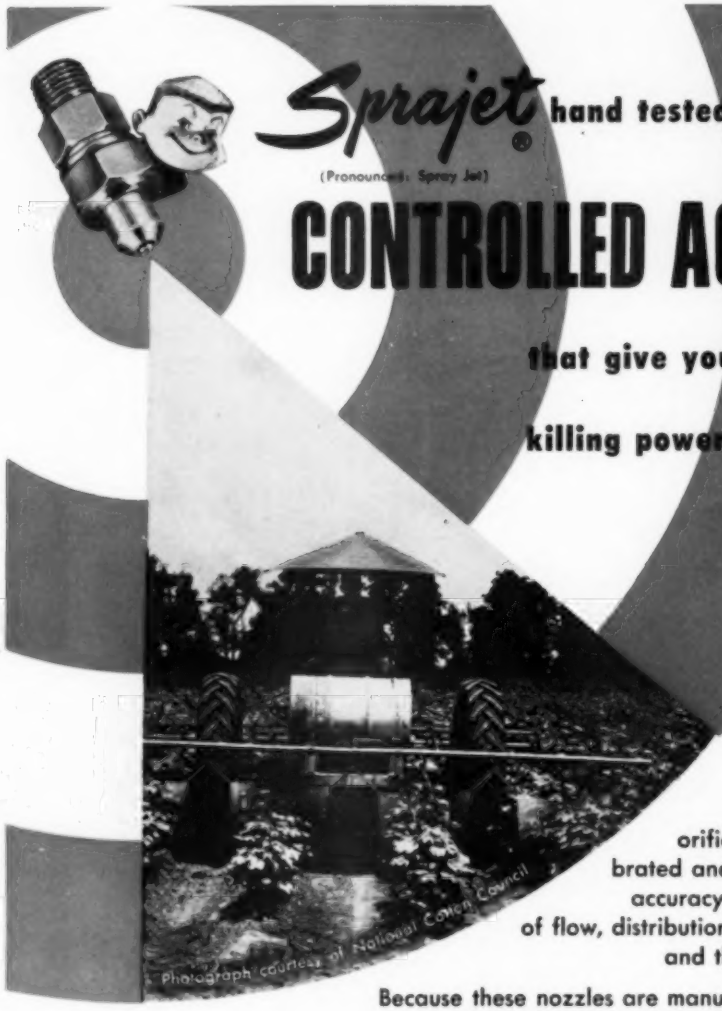

Sprajet Nozzle Tip orifices are individually calibrated and hand-tested for utmost accuracy. These tests cover rate of flow, distribution throughout the pattern and the angle of the pattern.

Because these nozzles are manufactured under the most rigid standards in the industry, we unconditionally guarantee Sprajet Nozzles for a full spraying season. Last year, out of the hundreds of thousands of Sprajet Nozzles produced, only eleven of them were returned for replacement.

To continually improve Sprajet and spraying techniques, we are co-operating with leading research organizations by supplying them with spraying equipment for experimental work.

We welcome opportunities to assist in the development of agricultural spraying.

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707 McGee Kansas City, Missouri

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Save 25% to 50% On Emulsifier Costs

Improve Your Insecticide Formulations

Now available! A new series of emulsifiers that increase the efficiency of your formulations while using less emulsifier per gallon of concentrate. Nothing in the field today can equal the versatility of COOPER EMULSIFIERS, all tried and proven by actual large scale field use.

COOPER ATX-60: (Pat. Pending)
For optimum performance in Toxaphene, Toxaphene/DDT, Aldrin and Dieldrin systems.

COOPER BCX-70: (Pat. Pending)
For optimum performance in BHC, BHC/DDT and Lindane systems.

COOPER CTX-54: (Pat. Pending)
For optimum performance in Toxaphene, Toxaphene/BHC, and Toxaphene/Lindane systems when unusual excellence of performance in dipping vats over long periods of time is required for livestock application.

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1. Spontaneous dispersion.
2. Suspension power.
3. Emulsion stability.
4. Effective in hard and soft water.
5. Perform with either aliphatic or aromatic solvents.
6. Reduce emulsifier requirements—less emulsifier required per gallon, thus reducing costs.
7. Versatility—each emulsifier gives optimum performance in many systems, thus reducing inventories.
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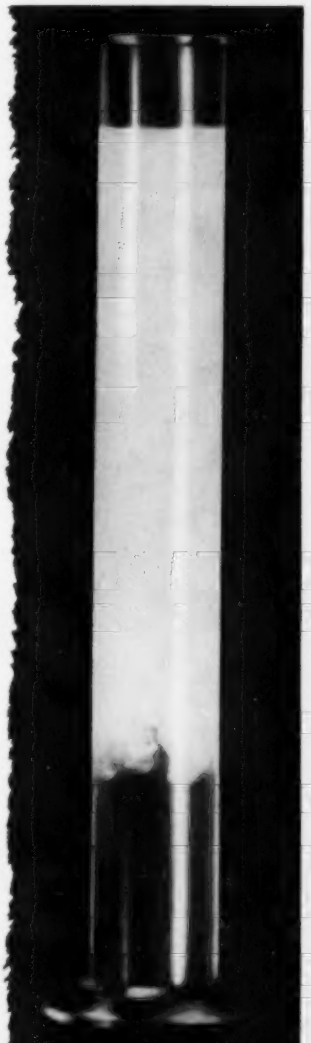

Actual photograph 6-lb. Toxaphene Gal. containing 3% Cooper Emulsifier ATX-60.

Samples...together with specification and formulation sheets, will be promptly sent upon request.

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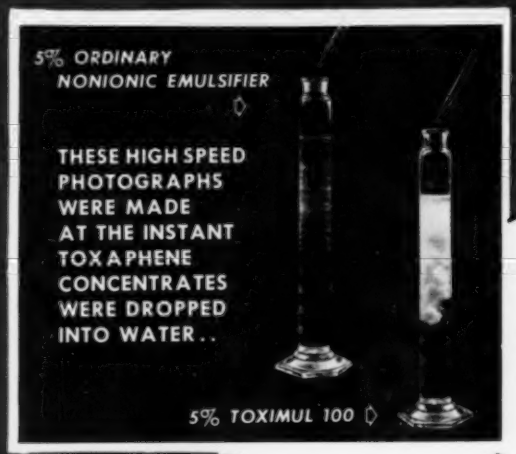
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SPONTANEOUS DISPERSION

use

NINOL TOXIMUL

a balanced anionic emulsifier for agricultural insecticides

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to inform

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NATIONAL AGRICULTURAL CHEMICALS ASSOCIATION

910 SEVENTEENTH STREET, N. W. WASHINGTON 6, D. C.

USE aldrin • dieldrin

see no weevil

The monkey sees no weevil *(Anthonomus grandis* Boh.) because he puts blinders over his eyes. The cotton grower will see no weevil if he keeps his eyes open, follows local recommendations, makes frequent field inspections of his crop and uses low dosage Aldrin or Dieldrin formulations when the need is indicated to protect his cotton from boll weevil and such pests as thrips, cutworms, armyworms, grasshoppers, fleahoppers and plant bugs. Bollworm infestation calls for the addition of DDT to the Aldrin or Dieldrin formulation.

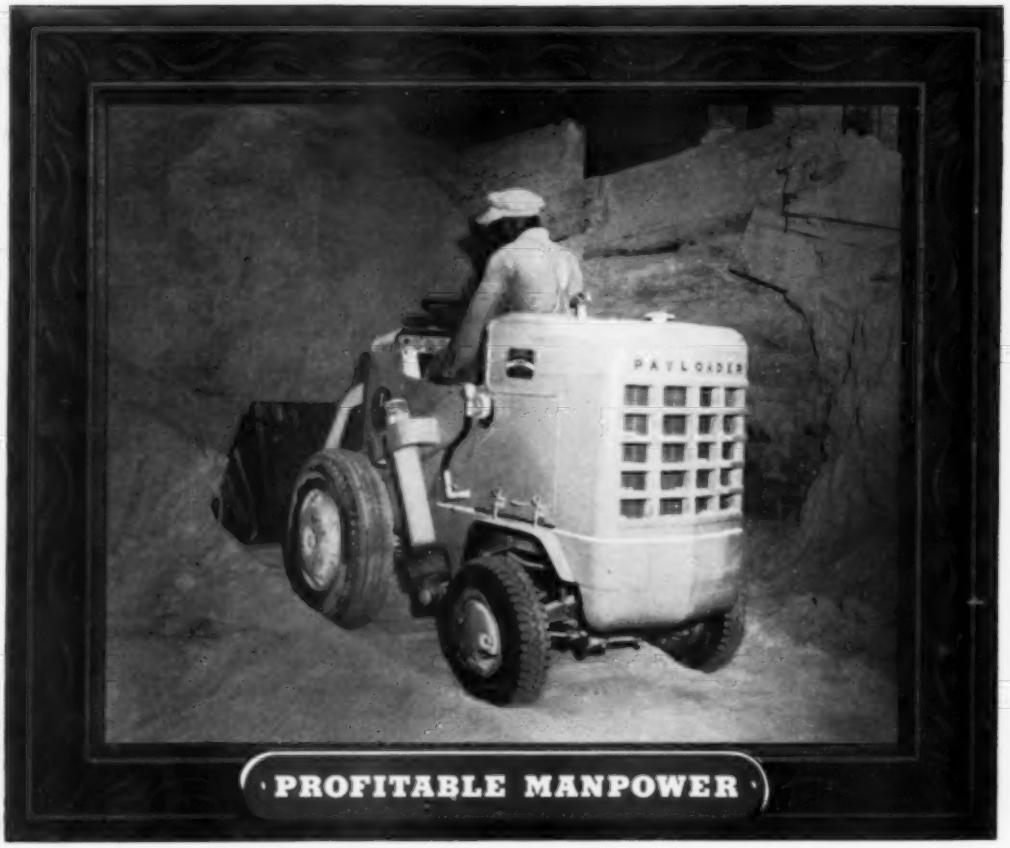
Aldrin and/or Dieldrin are officially recommended by the cotton growing states of the South for weevil and other cotton insect control. This is the world's most highly specialized agricultural region where more than 40% of the world's cotton is grown. An insecticide program, properly timed and applied, is one of the most effective means of assuring higher acre yield and greater profits. Aldrin and Dieldrin are the latest and most dependable weapons which science provides for the economical control of cotton pests.

Write today for more complete information. New cotton circulars available upon request.

Julian HYMAN & Company

DENVER, COLORADO

Shell Chemical Corporation, New York City, national distributors of agricultural chemicals and fumigants



PROFITABLE MANPOWER

This man may have been good with a wheelbarrow and hand shovel, but his productive capacity is several times greater as a "PAYLOADER" pilot. He's happier and so is his boss, because they both make more money.

"PAYLOADER" tractor-shovels are helping fertilizer and chemical plants slash production costs. They actually pay for themselves in a few months doing the many jobs listed here . . . doing them faster and cheaper — and release manpower for more productive work.

These special tractor-shovels are available in seven sizes, from 12 cu. ft. to 1½ cu. yd. to master your jobs both indoors and outdoors. Get full facts *now* on cost-cutting, time-saving, production-boosting "PAYLOADER". The Frank G. Hough Co., 743 Sunnyside Ave., Libertyville, Illinois.

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[redacted]

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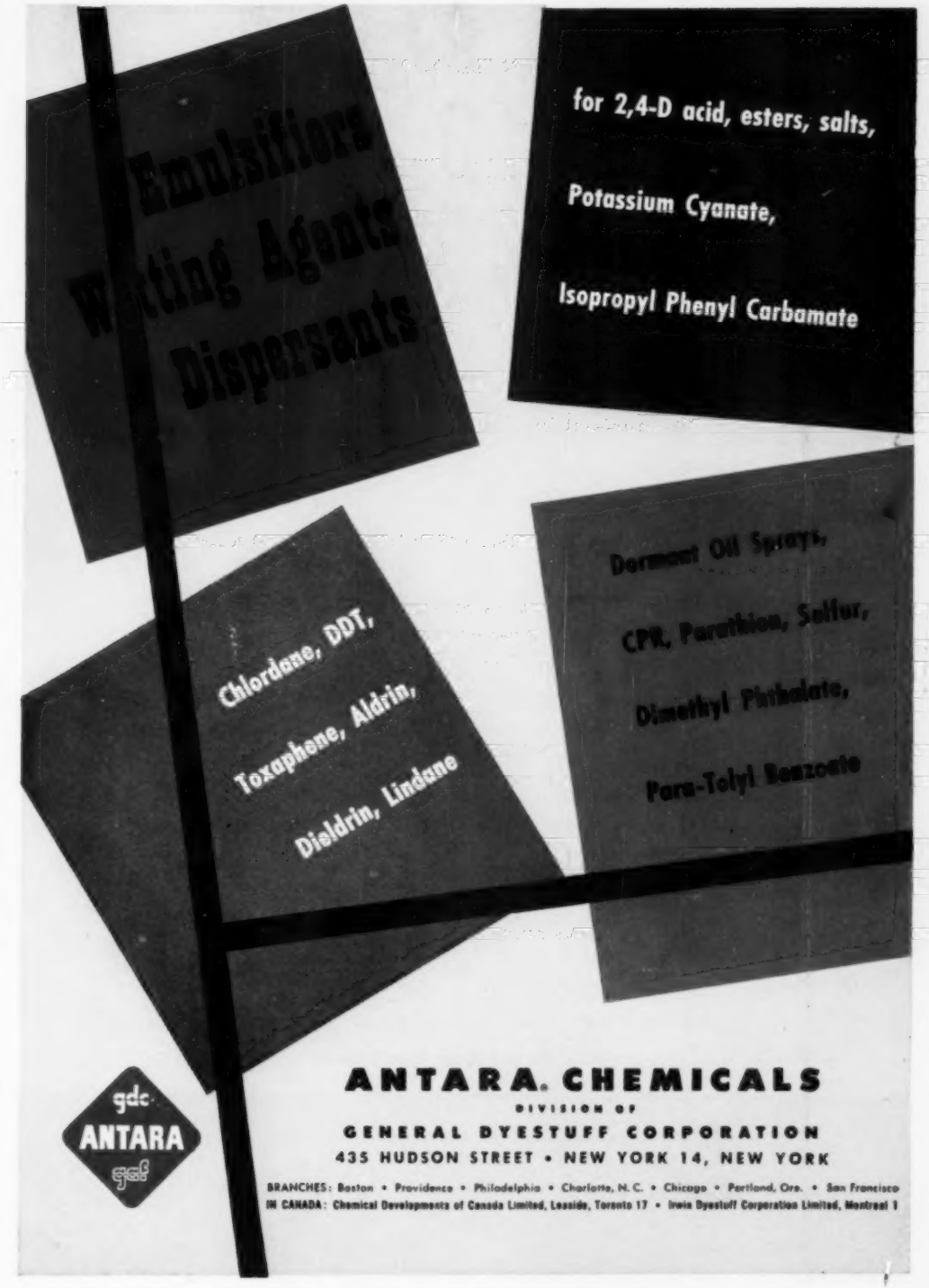
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offers definite advantages: safety, convenience, economy, fast action, high kill and residual control.

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Tri-Excel acts immediately, assuring a high kill even when rain falls within a few hours of application.

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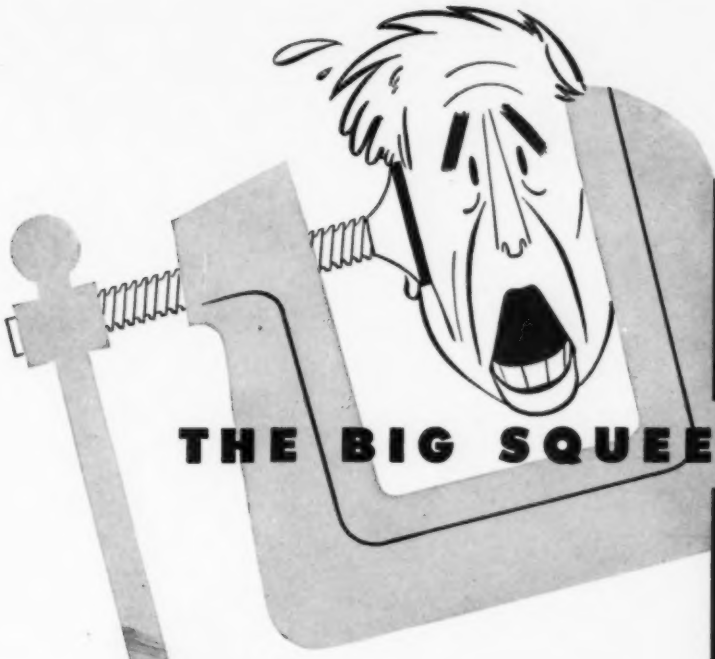

THE BIG SQUEEZE!

These bags conform to I.C.C. 2-D specifications

Plenty of people are caught in today's "Big Squeeze." If you find yourself between the rising costs of raw materials and controlled prices on finished products, Betner can help satisfy your demand for economical, high-quality packaging.

For instance, the Betner "Duo-Tite" bag is ideal for products that need sift-proof packaging. The "Duo-Tite" bag is constructed with special liners, gluing and heat-sealing. It's doubly protected with "Duo-Tite Turnover." Contents of the Betner "Duo-Tite" bag positively will not sift out—excellent for bulk powdered material.

The Betner "Duo-Tite" comes in sizes that hold one to twenty-five pounds of bulk powdered material. An extensive combination of colors and materials gives the Betner "Duo-Tite" bag extra display value.

AND it's economical!

COMPLETE SERVICE!

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• **Whatever the packaging need, there's a Betner bag . . . FILL IT!**

Benj C Betner Co *Devon, Pa.*

***Plants also located in:* Richmond, Virginia; Paris, Texas; Appleton, Wisconsin; Los Angeles, California**

This is good news in agriculture and in industry. Increased availability of vital plant nutrients in the form of soluble inorganic salts for fertilizer solutions can mean new products and new markets for fertilizer manufacturers.

New emphasis is being placed upon WATER-SOLUBLE FERTILIZERS. Growers and manufacturers are developing new methods . . . new applications of high-analysis soluble plant foods which combine NITROGEN . . . PHOSPHORUS, POTASH and, in many cases, weed killers and insecticides, too.

MONSANTO, to help meet the increasing demands for plant foods, has increased quantities of four basic, soluble fertilizer chemicals . . . MONO AMMONIUM PHOSPHATE . . . DI AMMONIUM PHOSPHATE . . . MONO POTASSIUM PHOSPHATE . . . PHOSPHORIC ACID 75.0%.

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Di Ammonium Phosphate (Crystals)	21.0%	53.85%	—0—
Mono Ammonium Phosphate (Crystals)	12.2%	61.61%	—0—
Phosphoric Acid (75.0%) (Liquid)	—0—	54.5%	—0—

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the big profits with...

.44

YOU'LL PROFIT WITH THIS KIND OF TACKLE...

We Furnish it!

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Bulletins
Informative, "easy to read," technical bulletins on virtually all phases of insect and weed control are available to you and your customers.

Folders
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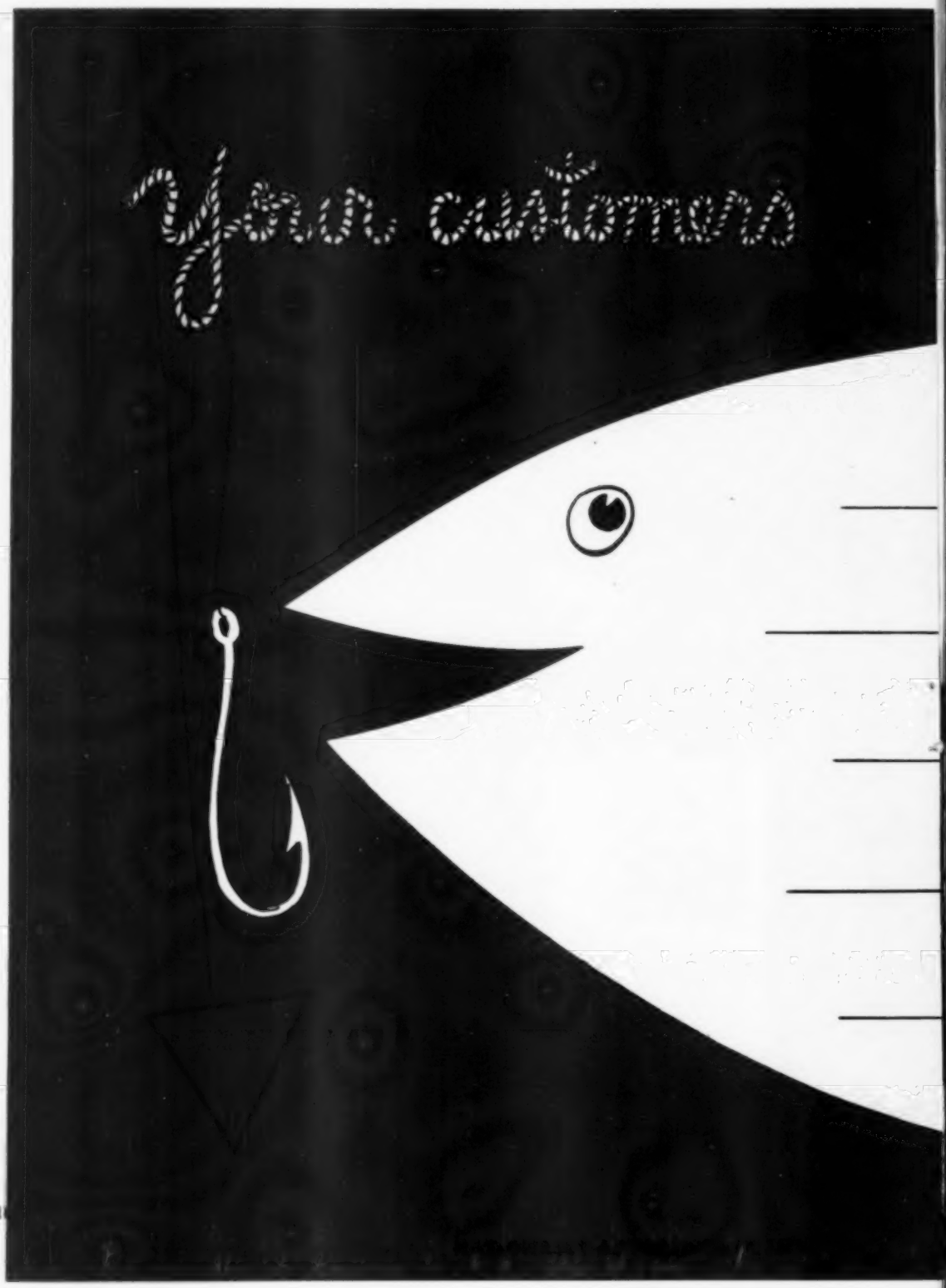
Local Advertising
Consistent, hard-hitting campaigns in your area supplement Colorado .44 large scale national advertising, and help pre-sell the customer and make dealer sales and dealer profits soar!


Ура, сапоги

go for the

TOXAPHENE
For better, more economical control of a wider variety of agricultural pests, we suggest Colorado .44 Toxaphene in various combinations and formulations. Colorado .44 Toxaphene is especially potent when used against grasshoppers, alfalfa weevils, armyworms, cutworms, lygus bugs and a variety of cotton pests.

BHC
If you're in the market for a profitable item for effective control of cotton and livestock pests, don't overlook Colorado .44 BHC. Show the farmers how they, too, can reap greater benefit through Colorado .44 BHC.

LIVESTOCK SPRAY
To stop livestock weight losses resulting from ticks, lice and flies, recommend Colorado .44 Gold Star Barn and Livestock Spray to your customers. It's the best solution for adding pounds to cattle and other livestock, because it eliminates the annoyance of weight reducing pests. Mixes easily in hard or soft water.

CHLORDANE CONCENTRATE
For the customer who prefers to mix his own solutions, suggest Colorado .44 Chlordane Concentrate. Extremely economical, yet effective for grasshopper, alfalfa looper, armyworm, and many other insect pests.

COTTON DUSTS
Here are more Colorado .44 products which can be applied with airplane, ground or hand equipment. Colorado .44 Cotton Dusts—in all formulations and combinations—are highly effective against boll worms, cotton leaf worms, boll weevils, thrips, and other cotton damaging bugs.

PARATHION
Recommend Colorado .44 Parathion. This versatile insect killer destroys the *green bug* in wheat and all small grains. Carry Colorado .44 Parathion and make your profit and the farmers' income greater. Also unusually effective against aphids, armyworm, citrus scales and many other destructive insects.

DAIRY SPRAY
Profit-eating livestock pests die fast when Colorado .44 Dairy Spray is used. This powerful insect killer will not harm cattle or humans if used as directed. It's a fast seller, and is fully approved by the USDA for use on dairy cattle. Non-toxic, non-injurious to livestock, poultry and warm blooded animals when used as directed.

ALDRIN
H-re's a versatile, fast-moving item which will sell because of its effective action against boll weevils, grasshoppers, locusts and many other destructive pests. Colorado .44 Aldrin features quick action, low-dosage ease of use, economy.

2,4,5-T
For the elimination of heavy brush, there's completely effective control to be found in Colorado .44 2,4,5-T. Available in many combinations to meet any kind of control desired, Colorado .44 2,4,5-T offers sure elimination of mesquite, scrub oak, stumps and other heavy brush.

DDT
Sell widely used Colorado .44 DDT to farmers and watch your profits soar! This is a particularly profitable item to sell in the corn belt because of its effective control of the *European Corn Borer*. Also can be used for high percentage kill of the alfalfa weevil, lygus bug, and countless other destructive insect pests.

.44

hook line and sinker

LINDANE
For sure, easy control of lice, flies and fleas on livestock, recommend Colorado .44 Lindane. Customers will appreciate the outstanding results of Lindane in controlling livestock pests. Lindane is also formulated to destroy many other agricultural insect pests—including grasshoppers and ants.

CHLORDANE
By stocking up on Colorado .44 Chlordane, you insure having on hand a quick, and permanent knockout for all wheat insects. It's easy to sell consumers on the idea that crop losses can be eradicated by Colorado .44 Chlordane's triple killing action, which kills by vapor, stomach poison, and contact.

2,4-D
Weeds that rob crops of moisture, sunlight and vital minerals are always a problem to farmers. With Colorado .44 2,4-D ester and amines in many economical formulations and strengths, weed and brush control can be achieved at a minimum of cost and labor. Mix in oil and water. Now, a new wonderful feature of Colorado .44 2,4-D Amine formulations. They will not freeze or go out of solution—even at *zero temperature!*

GRUB DUST
Colorado .44 Grub Dust gives almost 100% protection against cattle grubs and lice, thus reducing livestock weight losses. Can be used as dust, dip or spray. Just add a 7½ lb. pack of Colorado .44 Grub Dust to each 100 gallons of water...it kills cattle pests fast! Profits come naturally.

Specialized products

COTTON SPRAYS AND DUSTS

SPRAYS—Colorado .44 manufactures 9 varieties of Cotton Spray Concentrates. In all combinations—Aldrin, DDT, Dieldrin and Sulphur.

DUSTS—Colorado .44 formulates many combinations of Cotton Dusts, including those with Sulphur, DDT, Toxaphene, Dieldrin, Aldrin and BHC.

AIRPLANE SPRAYS AND DUSTS

Colorado .44 manufactures 153 products especially compounded for airplane application. Included are:

- Aero Butyl Ester 2,4-D
- Super "80" Butyl Ester 2,4-D
- Super Chlordane Concentrate
- Super Toxaphene Concentrate
- Super Parathion Concentrate
- Super Aldrin Concentrate
- Aldrin Equivalent Oil Concentrate

CORN INSECTICIDES

Colorado .44 DDT formulations provide *SURE* protection against corn borers and other destructive and costly corn insects. For greater sales and increased profit, feature the following:

- DDT-Emulsion Concentrate
- DDT-Wettable Powder
- DDT-Dust Concentrate

These, and other Colorado .44 insecticides are available for you today!

ALFALFA INSECTICIDES

Recommend these Colorado .44 products to farmers for faster knockdown, faster kill, and longer lasting killing power of destructive alfalfa insects.

- Aldrin
- Emulsifiable Chlordane Concentrate
- Super Chlordane Concentrate
- Emulsifiable Toxaphene Concentrate
- Super Toxaphene Concentrate

Stock up on these, and other alfalfa insecticides now for maximum profit.

CATTLE SPRAYS AND DUSTS

Control of weight-reducing livestock and dairy pests is becoming a bigger problem every year for farmers and cattlemen. Show them how they can control these pests with the following Colorado .44 products:

- Gold Star Livestock and Barn Concentrate
- Stock and Barn Insect Killer
- Dairy Spray
- Grub Dust
- Ben Hex 12 Wettable Powder
- Sheep Dust
- Lindane
- Rotenone

HOUSEHOLD PRODUCTS

A complete household insecticide and weed killer line is available for stock. These heavily promoted items are profitable to handle, because they sell fast and really do the job. The Colorado .44 household line is as follows:

- Colorado .44 Bug Killer
- Colorado .44 Ant and Roach Killer
- Colorado .44 Garden Spray
- Colorado .44 Garden Duster
- Colorado .44 Rid-O-Weed
- Colorado .44 Chlordane Concentrate

WEED KILLERS

This line-up of highly effective Colorado .44 weed and brush killers, is a guaranteed sales producer. Made of the finest tested formulations, they really do the job—and produce the profit.

- Butyl Ester 2,4D 40%
- 2,4-D Weed Killer Liquid Amine Concentrate
- Super "80" Butyl Ester 2,4-D
- Aero Butyl Ester 2,4-D
- Isopropyl Ester 2,4-D
- Super "80" Isopropyl 2,4-D
- Brush Murder
- Hi-Strength Brush Murder
- 2,4,5-T Concentrate
- Butyl Ester Brush Killer

WHEAT AND SMALL GRAIN INSECTICIDES

This coming season promises an unusually dangerous invasion of wheat and small grain insects. Help the farmer prepare for these destructive pests, by having on hand an adequate supply of Colorado .44 small grain insecticides. The following Colorado .44 products provide high kill, lasting control of aphids, red spiders, thrips, and *green bugs* in wheat and small grain.

- Parathion 25% Wettable Powder
- Parathion Dust 1%
- Super Parathion Concentrate

orado 44

INSECTICIDES
AND
WEED KILLERS

CALL THE PROFIT NUMBER:

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DENVER, COLORADO

COLORADO 44 BRAND

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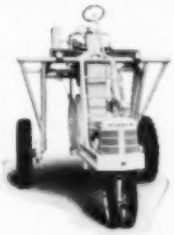

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YOUR dry dust concentrate will give top field performance—even though dense let-down agents have been added—when you use Celite.

You'll find that the presence of a small percentage of Celite—because of its great bulk per unit of weight, and the irregular shape of the individual particles—fluffs up the final dust and helps neutralize the effect of heavy extenders. Better dispersion in the field is thereby assured . . . at very little cost.

Celite offers other advantages, too:

As a Grinding Aid: Celite aids in grinding of both solid and semi-solid low melting point poisons and makes a more potent dry dust concentrate.

As an Absorption Medium: Celite's high liquid absorption capacity allows a higher percentage of liquid poison to be absorbed while still maintaining a "dry" dust. This gives you a highly concentrated product, and lower packaging and shipping costs.

The use of Celite as a diluent and grinding aid can well be a profitable one for your operation. For additional information, write to Johns-Manville, Box 290, New York 16, N. Y.

Properties of CELITE

FINENESS: Approximately 100% through 325 mesh
DENSITY (Vibrated): 11 pounds per cubic foot
BULK: Celite bulks much higher than most diluents
ABSORPTION: 200% of its weight of water
300% of its weight of kerosene
pH VALUE: Below 7.0
INERTNESS: Compatible with insecticide and fungicide poisons
SUSPENSION: Excellent in both air and water
COMPOSITION: Celite is amorphous diatomaceous silica (SiO_2)

Celite is Johns-Manville's registered trade mark for its diatomaceous silica products.

Johns-Manville CELITE

JM PRODUCTS

DILUENTS AND GRINDING AIDS

this season SELL SINOX PE

for control of weeds in bean fields by Pre-Emergence spraying

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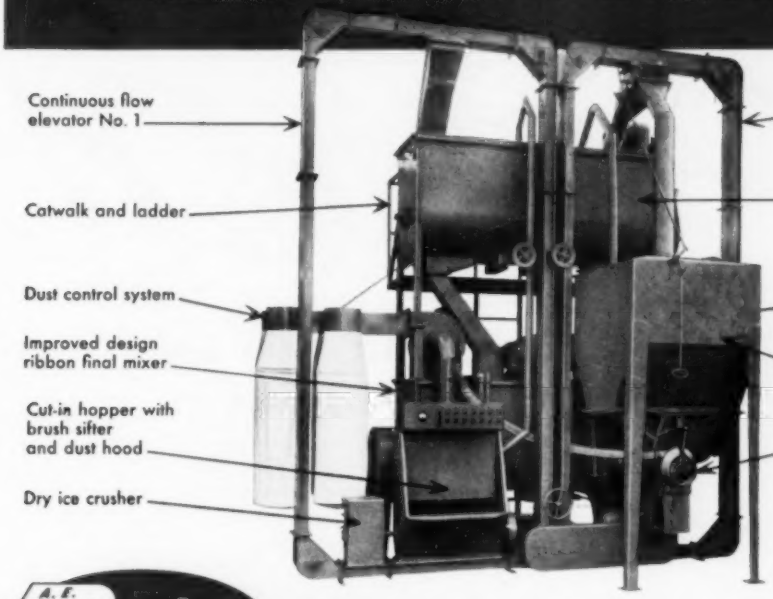
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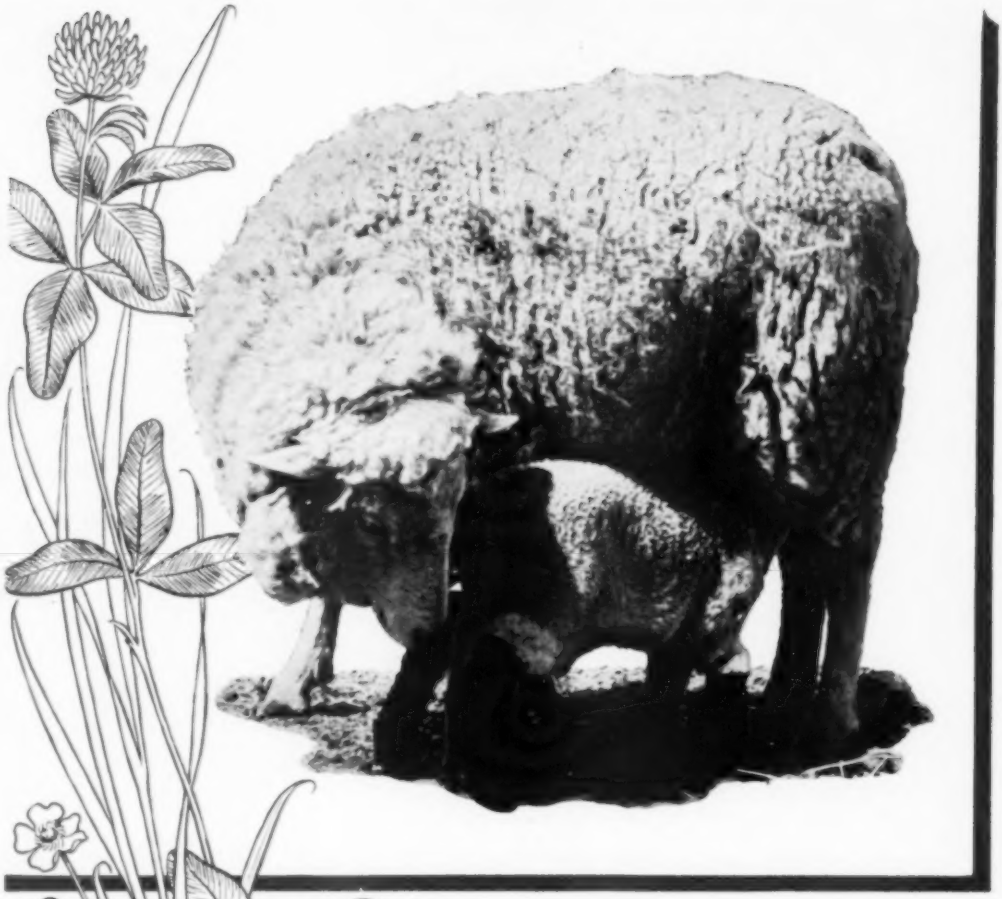

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THE EDITOR COMMENTS

WITH some 900,000 tons of additional nitrogen fertilizer expected to available for use in 1955, the U. S. Department of agriculture is taking steps to see that it is used efficiently and effectively in meeting the food and fibre needs of the country.

A recent letter addressed to state extension directors from M. L. Wilson, director of extension work, U.S.D.A., Washington, urged the use of a higher ratio of nitrogen in fertilizer mixtures this year. He also warned against delay in purchasing fertilizers early. "Any piling up of fertilizer slows down our present program for expanding its production," he said.

A work group composed of representatives of the Agricultural Research Administration, Bureau of Agricultural Economics and the Production and Marketing Administration, brought together by A. W. Minor, Assistant to the Secretary of Agriculture,, has reported as follows on the benefits of using more nitrogen:

"Nitrogen, if balanced with phosphate and potash, gives spectacular results in increasing corn production. As a national average, every two pounds of nitrogen added to corn will increase production by one bushel. The average price of 2 pounds of fertilizer nitrogen to farmers is about 30 to 35 cents.

"Fertilizers applied to corn usually do not contain as large a proportion of nitrogen as should be the case to obtain maximum benefits. There are many instances when farmers apply only one-fourth as much nitrogen as phosphate when local conditions indicate the two plant foods should be applied in equal proportions."

The state extension directors were also reminded that this year there will be 7% more nitrogen and 6% less phosphate than last year. This was pointed out as an opportunity to use "stronger" nitrogen fertilizers than ever before.

The fertilizer industry should take note of the trend toward greater nitrogen content in mixtures. It should be a good omen.

EUROPEANS have long marveled at our ability in America to run one of the largest and certainly the richest and most complex country in the world with our rather uncoordinated type of government. We have recently had a wonderful example of the way our various government agencies often work at cross purposes, apparently each in ignorance of what some other governmental branch may be doing. As a case in point, the Delaney Committee for many months past has been investigating the use of chemicals on foodstuffs, with many of the witnesses that they have called belaboring producers of agricultural chemicals for risking the national health by selling chemicals for crop application.

Now, we have a report on the same general subject emanating from another government agency, this time the Subcommittee on Labor and Labor-Management Relations, U. S. Senate. But this report, taking quite a different tone, indicates "chemicals have become as important to modern agriculture as the plow and the hoe". Going further to cite the tremendous advances that have resulted in agricultural output from the increased use of agricultural chemicals, it is pointed out that "the use of insecticides, fungicides and herbicides has brought a phenomenal increase in yield per acre." So great has been and will be the contribution of chemicals to agricultural output, according to these researchers, that by 1970 it may be possible to reduce the number of agricultural workers by almost 40% from the present agricultural productive force now needed to feed us.

To the man in the street, and the man behind the typewriter, it seems that it would be the simplest and most direct thing in the world for the Delaney Committee to have access to the same source material as the Senate's Labor Committee, — or at least might they not call the chairman of this subcommittee as a witness? But, in government, things seldom move that simply or directly. Each agency must make

(*Continued on Page 87*)

Photo Above:

Corn was grown to silking and tasseling stage and radioisotopes were added in dilute acid solution. Here is the result of silver (Ag110) which was added to the culture July 25, 1951. The leaf tissue was sampled September 6, 1951, and the autoradiograph was begun on October 23. Exposure was made for 10 days. Note the marked marginal accumulation shown in black, on the leaves.

by

Dr. J. D. Sayre

Ohio Agricultural Experiment Station and Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, United States Department of Agriculture, Wooster, Ohio.

RADIOACTIVE isotopes of many elements[1] can be used to picture the location of the elements in corn leaves. These pictures are made by the radiations from the elements themselves and are called autoradiographs. Some of them are shown in this article.

First it is necessary to get the isotopes into the corn leaves. This is done by growing corn to the silking and tasseling stage in tanks containing gravel sub-irrigated with a nutrient solution. When the leaves have reached their maximum size the radioisotopes were added in a very dilute acid solution to the cultures. The plants absorb the isotopes through the root system and they move to all parts of the plant. Samples of the leaves can then be taken, pressed, dried, and autoradiographed. The series of autoradiographs shown in this article were obtained in this way. They show the distribution and location of some of the elements that accumulate in the corn leaf. They were obtained

[1]The radioactive isotopes used in this work were obtained from the Isotopes Division of the Atomic Energy Commission, Oak Ridge, Tennessee.

Autoradiographs Reveal Course taken by added

Plant Nutrients

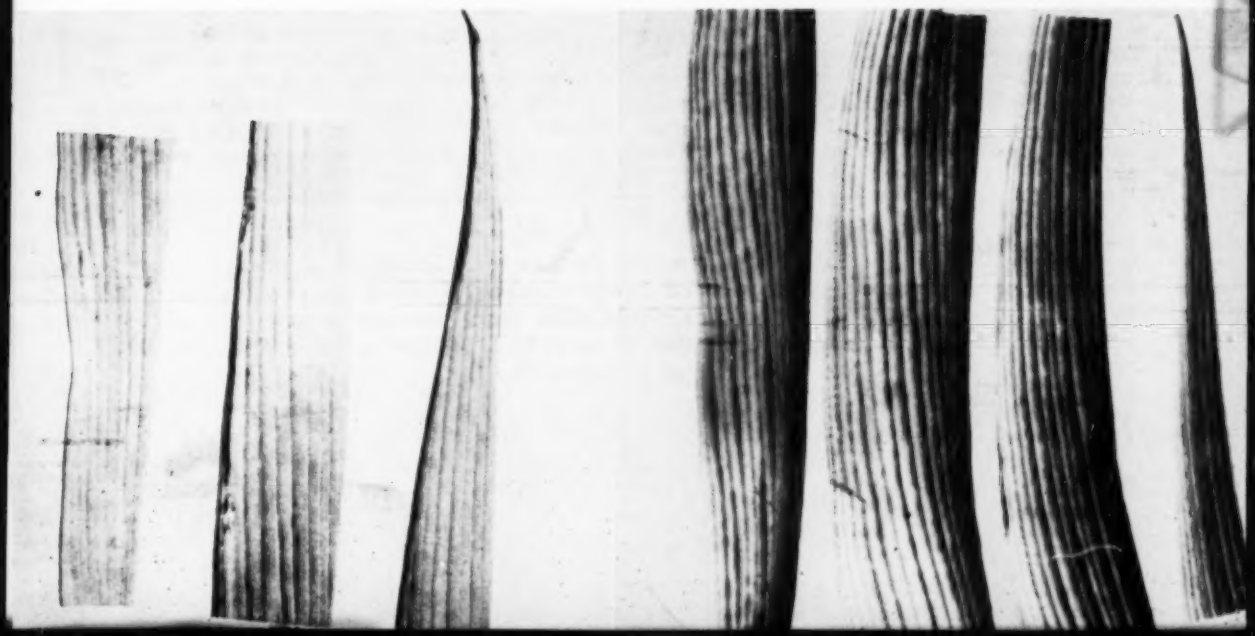
during the past two summers at the Ohio Agricultural Experiment Station [2] in a study of the mineral nutrition of corn.

Calcium (Ca^{45}) when put into a corn plant in this way was quite

[2] Supported in part by a grant from the International Minerals and Chemical Corporation.

Photo below (left): Result of mercury having been added to culture on July 24th. Leaf tissue was sampled August 14th and the leaf autoradiographed beginning October 7. Exposure was for 25 days. Marginal accumulation is evident here, too.

Below (right): Uniform distribution over the entire leaf, but more activity showing in and around the primary veins is the result of zinc (Zn^{65}) being added to the culture July 25th. Leaf tissue was sampled on August 18 and the autoradiograph began January 23. Exposure, 8 days.



Photos Above

(Left) Very marked marginal accumulation resulting from addition of Cobalt (Co60) on July 25. Leaf tissue was sampled on August 8 and autoradiograph began on November 15. Exposure continued for eight days.

(Right) Some marginal accumulation is noted as the result of adding antimony (Sb124) on July 24. The leaf tissue was sampled on August 14, and the autoradiograph was begun on August 26. Exposure, 5 days.

evenly distributed throughout the leaf. Added amounts of zinc (Zn 65) accumulated mostly around the large primary veins of the leaf. (Page 35) Cobalt (Co60) accumulated in great quantities along the margins of the leaf. This is shown on this page. There was also some accumulation in the blade of the leaf in smaller amounts. Wolfram (W 185), also showed a uniform accumulation over the leaf. Iridium (Ir 192), similar to cobalt, showed marked marginal accumulation but also a large amount throughout the whole leaf.

Caesium (Cs 134), shows a very uniform location all over the leaf blade with the primary veins quite marked. Autoradiographs of both silver (Ag 110), (Page 34), and mercury (Hg 203), showed up a very striking marginal accumulation in the leaf.

These autoradiographs show that there is considerable difference in the way in which the isotopes accumulate in the corn leaves when they are put in cultures of this kind. These facts are being used in studies of deficiency and toxicity symptoms of essential elements and also those non-essential elements which might accumulate in plants. It should be emphasized that the quantity of the different ions used in these experiments is very low. It did not cause any toxicity in the leaf tissues although a good picture was obtained of its distribution. The ability to follow the movement of radioactive isotopes into and through the plant without using enough of the element to cause injury is one of the very important developments in the use of radioactive elements in agriculture.

Differences in the way isotopes accumulate in corn leaves being studied in connection with deficiencies and toxicity symptoms of essential elements. Ability to follow movement of isotopes through plant is revealing.

M.W. SHADE TREE MEETING

By H. H. Slawson

CHEMOTHERAPY may be the key to control of oak wilt, fungus disease ravaging oak forests in the midwest and in scattered locations over an extensive area. This was the word brought to the seventh annual meeting of the Midwest Chapter of the National Shade Tree Conference in Chicago Feb. 13 to 15, by Dr. Paul Hoffman of the Illinois Natural History Survey, Urbana.

The battle to save the oak trees, however, is not yet won, Dr. Hoffman cautioned the 350 arborists, park executives, scientists and others interested in tree care who attended the LaSalle Hotel meeting. However, promising results were obtained by injecting into the soil certain chemicals in the root feeding zone of trees infected with the oak wilt fungus. Red oak trees, which commonly die within two to three weeks after infection, responded to this treatment with particularly successful results.

Investigation of possibilities for control of oak wilt by treating the host plant were started at Urbana in 1949, Dr. Hoffman related. From a long list of chemical compounds, thirty were selected for intensive examination with special reference to their ability to neutralize the toxic substance produced by the fungus.

In that first year, various chemicals were injected directly into 62 trees, with no success, he said. In 1950, the soil injection method was tried on 450 trees. Last year the number of trees treated was increased to 1,400 and the results, Dr. Hoffman stated, "give us much encouragement."

He emphasized that the soil injection method is not a cure for oak wilt, but that it does offer promise of a definite degree of control.

Of about a million and a half different species of insects, some 700,000 are associated with trees, Dr. Roy D. Shenefelt of the Univ. of Wisconsin stated in a paper, "Insects as Carriers of Disease." Some species of oak trees, alone, he said, are supposed to be the particular target of about 1,000 different insects.

To determine which insect is actually involved in transmission of a given disease and what conditions insects cause that make it possible for the disease to persist, an infinitely painstaking procedure must be followed, he continued, before the proper control treatment can be prescribed. All possible insect vectors must be first determined, he explained, followed by an elimination process until the most probable suspects are selected. Then, and only then, he declared, can control methods and means be devised. His concluding remark that entomologists are "definitely researchers," reminded the session chairman of the definition of a researcher as "a man who doesn't know what he is looking for but is not happy until he finds it."

Symposium Held

IN a symposium on "Tree Pests" two outstanding authorities presented run downs on diseases of evergreens and shade trees while a third speaker discussed control of canker worms and scale insects.

Dr. Paul Tilford, executive secretary of the National Arborists Association, listed the more common diseases of pines and junifers, described their identifying symptoms, their insect or fungus causes and the recommended control measures.

Dr. T. W. Bretz, USDA, Bureau of Plant Pathology, stationed at the Univ. of Missouri, confined his discussion of shade tree diseases to oak wilt, elm phloem necrosis and Dutch elm disease.

When oak wilt was first noted, he said, it was thought to be confined to a relatively small midwestern area, but it now exists in eighteen states, from Kansas and Nebraska on the west to Maryland and Virginia on the east and north and south from Wisconsin to Arkansas. As prevalence of the disease increases in forests, he declared, its appearance on urban streets and lawns is also likely to increase.

Elm phloem necrosis, Dr. Bretz continued, has now spread from northern areas into southern states, with Jackson, Miss., as the present farthest southpoint. Use of DDT, properly formulated and properly applied at the right season for control of the insect vector is only a stop gap, he said, and he pointed out the great need for development of elm trees resistant to this disease.

E. F. Herback, entomologist with Standard Oil Co. (Ind.) described canker worm cycles, effects on oak, hickory and other shade trees and the recommended treatment with lead arsenate and a sticker. Slides were also presented with a discussion of red spiders and various common scale insects. Discussion following a question from the floor brought out that canker worms can be controlled as effectively by airplane spraying as by a mist blower, provided the DDT is spread uniformly.

Responding to the urging of arborists, the Univ. of Illinois is considering presentation of a short course for arborists, probably to be offered for the first time in the winter of 1953, it was announced at the Chicago meeting. Dr. L. R. Tehon of the university staff, explained that positive action and details are yet to be worked out.

Vance Shield, Clayton, Mo., arborist, was elected president of the Midwest Chapter for the coming

(*Turn to Page* 121)

Boll Weevil, Boll Worm Control Discussed at Meeting of

Cotton States Entomologists

ENTOMOLOGISTS, plant pathologists, agronomists, fertilizer representatives and numerous college and experiment station people were in attendance at the 49th annual convention of the Association of Southern Agricultural Workers at the Biltmore Hotel, Atlanta, Ga., February 4-6. The meeting attracted more than a thousand persons.

Held in connection with the A.S.A.W., was the 26th annual meeting of the Cotton States Branch of the American Association of Economic Entomologists. The group elected as its chairman, Dr. K. L. Cockerham, Baton Rouge, La., who succeeds Charles H. Alden, State Entomologist, Atlanta, Ga. A. L. Hammer, State College, Miss., was elected vice-chairman to succeed Mr. Cockerham. L. C. Murphree, State College, Miss., will remain as secretary-treasurer of the Branch.

The program at the first morning's session included a talk by chairman Alden on "Changes in Entomology That Have Occurred in the Past Thirty-five Years." He reviewed the history of the science, contrasting the materials and methods of old with those of the present. (His complete paper appears on page 51, this issue.)

Dr. E. F. Knipling, Assistant Chief, Bureau of Entomology and Plant Quarantine, U. S. Dept. of Agriculture, Washington, D. C. and president of the American Association of Economic Entomologists, spoke briefly to the group, reporting on the recent Cincinnati meeting of the national organization and commenting on the advancement of entomology in general during the past few years.

A paper by S. L. Calhoun and E. W. Dunnam, U.S.D.A., Leland, Miss., discussed "Compound 269" as "A Promising New Insecticide for Control of Cotton Insects." The paper told of field tests with the material against boll weevil, bollworm, and the tobacco budworm. Concentrate emulsion sprays were applied to cotton in one test by tractor operated spray equipment and in another by airplane at a rate of 0.2 pound of active ingredient per acre. Boll weevil control equal to that of dieldrin was secured, and the material gave bollworm control slightly superior to a combination of 0.2 pound of dieldrin plus 0.5 pound of DDT, the paper said.

A study to determine the dosage level of heptachlor required for control of boll weevil, was presented by the same authors in a second paper at the morning session. They reported that the material was tested at dosage levels of 0.25, 0.35 and 0.50 pound per acre as an emulsion spray applied with tractor equipment, and as a dust at concentrations of 2.5%, 3.5% and 5.0%, also applied with tractor. Comparisons of boll weevil control were made with recommended dosage levels of aldrin, dieldrin and chlor-

Photos below, left to right: Miss Ellen Phillips, Georgia Dept. of Entomology, Atlanta; Arthur Heinel, Atlas Powder Co., Wilmington; and C. R. Jordan, Athens, Ga.

(Right): O. I. Snapp, Ft. Valley, Ga., vice-chairman of the program committee, and Wm. B. Blassingame, assistant director, Ga. State Dept. of Entomology, chairman of the arrangements committee.

dane as sprays and with aldrin, dieldrin and BHC as dusts. No significant difference in control was found between dosage levels of heptachlor, or between heptachlor and either of the recommended materials.

Further reports on insecticides for control of cotton insects were presented by Charles Lincoln and F. J. Williams, Arkansas Agricultural Experiment Station, Fayetteville, Ark.; J. S. Roussel, L. D. Newsom and C. E. Smith, Louisiana Station, Baton Rouge; and M. T. Young and R. C. Gaines, U.S.D.A., Tallulah, La.

A discussion of "Volume of Spray and Nozzles per Row in Relation to Boll Weevil Control" was presented in a paper by L. C. Fife and R. L. Walker, U.S.D.A., Florence, S. C. They reported that treatments delivering 2, 6, and 12 gallons of toxaphene emulsion spray per acre were equally effective against the boll weevil, providing the proper amount of insecticide was used. Equal boll weevil control was obtained with 1, 2, or 3 nozzles per row, when comparable dosages of toxaphene and gallons of spray per acre were applied. Time and labor can be reduced greatly in spraying operations by using nozzles delivering relatively small amounts of spray per acre, they said.

"Tests with a Smoke Generating Device for Cotton Insect Control" were described by J. G. Watts, Edisto Experiment Station, Blackville, S. C. The "cotton smoker" device, attaching to the manifold of a tractor, vaporizes the insecticide by the exhaust heat. According to the tests thus made, the smoke generator failed to apply toxaphene as successfully as is done with dusts and sprays in the conventional manner.

The insecticide EPN was reported to be "by far" the most effective material used for control of the yellow-striped armyworm in cotton, according to a paper by Wm. L. Lowry and S. L. Calhoun, U.S.D.A., Leland, Miss. Their paper indicated that the need for more effective control measures against the yellow-striped armyworm as illustrated by

Photos this page:

Top photo (L to R): L. C. Murphree, State College, Miss., secretary-treasurer of Cotton States Branch, and Charles H. Alden, Georgia State Entomologist, Atlanta, retiring president.

Second photo: Dr. E. F. Knipling, U.S.D.A., president of American Association of Economic Entomologists, Washington, D.C.; Dr. W. L. Popham, assistant chief, Bureau of Entomology and Plant Quarantine, U.S.D.A., Washington; George F. ("Grub") Leonard, executive vice-president, Tobacco By-Products & Chemical Corp., and former president of National Agricultural Chemicals Assn., Richmond, Va.; Monte Budd, Hercules Powder Co., Wilmington, Del.; and Dr. P. D. Peterson, Stauffer Chemical Co., New York.

J. M. Magner; Wm. Jarnagin, Attapulgus Clay Co., Philadelphia; J. M. Amos, Blackburg, Va.; and E. N. Woodbury, Hercules Powder Co., Wilmington, Del.

Richard Hartley, W. A. Cleary Co.; Wm. Feustel, R. T. Vanderbilt Co., New York; W. W. Stanley, U. of Tennessee, Knoxville; and M. M. Darley, General Chemical Division, Allied Chemical & Dye Corp., New York.

George D. Rohwer, son of the late S. A. Rohwer, U.S.D.A., Macon, Ga.; Mrs. G. D. Rohwer and Dr. M. D. Farrar, Clemson, S.C., chairman of the program committee.

Douglas Purswell, Cotton Producers Association, Atlanta; George Black, Auburn, Alabama; Miss Ellen Phillips, Ga. State Dept. of Entomology, Atlanta; E. H. Wilson, American Cyanamid Co., Montgomery, Ala.; Martell McGee, Calif. Spray Chemical Co., Decatur, Ala.

the damage caused by this pest in the Mississippi Delta. "EPN, the only organic phosphate in the tests, was by far the most effective insecticide used," the paper said. "When applied to small plants at the rate of 1 gallon of spray per acre, dosages of 0.10 pound of EPN, 0.33 of toxaphene and 0.30 of Compound 269, gave excellent, satisfactory and substantial control, respectively."

Somewhat higher dosages of the chemicals showed that 0.20 pound of EPN, 0.33 pound of TDE, 0.85 pound of toxaphene and 0.33 pound of DDT gave perfect, good, satisfactory and substantial control, respectively.

Tests with a number of insecticides against the Fall Armyworm indicated that "Compound 269" and toxaphene were most effective (at rates of 0.20 pound per acre), according to a paper presented by R. E. Furr, Mississippi Station and S. L. Calhoun. Emulsions of various insecticides were used at the following rates per acre: aldrin, 0.25 pound; chlordane, 1.00; "Compound 269", 0.10 and 0.20; "Compound 711", 0.10 and 0.20; DDT, 0.50; dieldrin, 0.15; EPN, 0.30; GBHC, 0.40; heptachlor, 0.50; parathion, 0.20; DDD or TDE, 0.50; TEPP, 0.10 and 0.20; and toxaphene, 2.00. The only material effective at doses under 0.20 pound per acre, was dieldrin.

"Compound 269", dieldrin, DDT, TDE and toxaphene were reported to be the most effective chemicals tested against Variegated Cutworm, in a paper by Lowry and Calhoun. They said that chlordane, EPN, heptachlor and parathion were relatively ineffective. At the most effective dosage levels, all of the chemicals that were highly toxic to the pest gave good to excellent residual kill when larvae were introduced in cages 48 hours after plants had been sprayed.

Co-operation Stressed

A SPECIAL discussion session on the importance of co-ordinating the agricultural programs of the cotton states in view of potential insect problems was led by W. L. Popham, assistant chief, Bureau of Entomology and Plant Quarantine, Washington, D. C. M. D. Farrar, Clemson, S. C. chairman of the Tuesday morning session, introduced the subject by pointing out the scope of some of the problems facing southern agriculturists. He said that insect contamination of foodstuffs is preventing interstate shipments in some cases, and that the problem is potentially of serious nature.

W. A. Minor, Assistant to the Secretary of Agriculture, Washington, was called on to comment on the situation. He agreed that final solution of the insect problem must be gained through cooperative effort between state and federal workers. The south was lauded for its progressive attitude toward the insect pest control problem.

C. H. Alden commented that it is impossible for individual states to carry on all of the projects needed to work out solutions of current problems. "No state has sufficient funds to carry on as much control work as is needed," he said.

Clay Lyle, Dean of Agriculture, Mississippi State College, told of working together closely with federal workers to such an extent that to the casual observer, it is almost impossible to tell which persons are working for the state and which for the federal government.

He declared, however, that states should not go to Washington for financial assistance on any project they can handle themselves. "Taxes are high enough now," he observed.

In a discussion of problems of insecticides used in the soil, W. C. Nettles, Clemson, S. C., reviewed some of the older problems of soil contamination dating back 25 years when excessive use of calcium arsenate for control of boll weevil, was practiced. Extensive studies indicated that such a toxicant in the soil affected growth of legumes, but that the poison would leach out. Heavy clay soils are not affected as seriously as light sandy soils.

Dr. Nettles recalled that with the lowering of cotton prices in the 30's, less calcium arsenate was used, and later, the newer insecticides were introduced to the area. He said that successful wireworm control has been obtained by applications of insecticide-fertilizer mixtures. One such mixture will be applied on 90,000 acres in South Carolina this year, he said. Farmers using this type of pest control were urged by Dr. Nettles to read and obey instructions to the letter.

Further discussions from the

(*Turn to Page 122*)

A number of chemical manufacturers maintained suites at the Biltmore during the Southern Agricultural Workers' Association meeting. Here is a group of Spencer Chemical Company people pictured in their suite.

Southern Weed Conference Studies New Herbicides

IMMEDIATELY following the A.S.A.W. convention and the meeting of the Cotton States Branch of the A.A.E.E., the Southern Weed Control Conference got under way on February 6.

Dr. Byron T. Shaw, administrator of the Agricultural Research Administration, U. S. D. A., stressed the necessity for more and more research to help agriculture to meet its food-producing requirements. "In all agricultural fields, research must develop the methods and provide the tools farmers should have to meet our food requirements", he said. "Agriculture faces a real job just to hold what it has gained in controlling insects and maintaining the soil. To supply 190 million people with food in 1975, we must do a great deal more than that."

The Southern Weed Conference elected these officers for the coming year: president, D. A. Hinkle, University of Arkansas; vice-president, W. B. Ennis, Jr., Mississippi State College; and secretary-treasurer, G. C. Klingman, N. C. State College. To the executive board: W. B. Albert, Clemson College; and H. A. Nation, Dow Chemical Co., Auburn, Ala.

That agricultural production goals for 1952 are higher than ever before, was pointed out by the ARA executive. These production figures include an increase of 15% in corn, over 1951; 29% in grain sorghum; 5% in cotton; 18% in wheat; 12% in flaxseed and a greater production of livestock.

To meet these needs, Dr. Shaw told the conference that more efficiency than ever before must be introduced in agriculture, with increasing attention to use of technical and scientific knowledge, particularly the use of agricultural chemicals in aiding crop production.

Dr. Shaw pointed out how

(*Turn to Page* 120)

In the Photos:

(Back row) O. E. Sell, Experiment, Ga.; E. S. Hagood, Experiment, Ga.; E. C. Tullis, Frederick, Md.; D. A. Hinkle, Fayetteville, Ark.

Front row: 1951 Officers of Southern Weed Conference: A. J. Loustalot, Mayaguez, Puerto Rico, vice-president; G. M. Shear, Virginia Agricultural Experiment Station, president; and G. C. Klingman, Raleigh, N.C., secretary-treasurer.

E. H. Bailey, American Potash Institute; Dr. W. R. Thompson, Mississippi State College; Charles A. Sheffield,, US.D.A., Washington, D.C.

W. G. Cowperthwaite, Gulf Coast Experiment Station, Bradenton, Fla.; Mark B. Weed, E. I. duPont de Nemours & Co., Inc., Baton Rouge, La.; T. C. Ryker, and G. L. McCali, both of duPont, Wilmington.

Jack R. W. Wilson, Stockton, California; and L. E. Cowart, E. I. duPont de Nemours & Co., Inc., Baton Rouge, La.

Dr. W. H. Purser, Clemson, S.C.; Arthur Kelman, Dept. of Plant Pathology, N. Carolina State, Raleigh; N. D. Morgan, Shreveport, La.; Robert Aycock, Blackville, S.C.; L. D. Newsom, Baton Rouge, La.; and D. W. Newsom, Blackville, S.C.

Henry Simmons, "Farm & Ranch—Southern Agriculturist," Nashville, Tenn.; Lawrence Southwick, Dow Chemical Co., Midland, Mich.; and H. A. Nation, Auburn, Alabama.

V. E. Green, Jr., Belle Glade, Fla., and A. A. Nickitin, Tennessee Corp., Atlanta.

Is it a fertilizer? Will it compete with the sale of soil nutrients? How will it fit in with other chemicals for agriculture? These and other questions are answered in this article, written especially for this issue of "Agricultural Chemicals." It tells completely

The Story of "KRILIUM"

IT is no reflection on metropolitan newspapers and the trade press of the country to bring to light the problems which face any chemical company in the announcement of new products. Despite the professional accuracy and care with which the great majority of newspapers and magazines handle such announcements, and despite the efforts of the company to avoid exaggerated claims and misunderstandings, certain false

by

C. P. Zorsch

Organic Chemicals Division
Monsanto Chemical Company
St. Louis, Mo.

In The Photos:

(Opposite page) Two months after seeding these erosion plots, Ohio State University student Wm. Quicksall points to Krilium-treated soil which is contrasted with the erosion seen in untreated soil back of him. A barrier of straw mulch divides the two plots.

(This page): Upper photo shows radishes planted in Krilium-treated soil, and below, the same in untreated soil which shrank and dried to a hard crust from watering. Greater germination resulted in the treated soil (above) which had been handled in exactly the same manner as the untreated portion.

impressions or definitions of a new product do occur occasionally.

This area of misunderstanding is almost invariably enlarged if a product is genuinely new—if its applications in certain fields are without precedent. Occasionally an editorial writer will begin where a news story leaves off. With the best intentions, he may theorize on *potential* future applications of the product. The resultant commentary is not deliberately inaccurate, but it sometimes may confuse the potential consumer.

When Monsanto Chemical Company recently announced "Krilium," its new soil conditioner, the company exercised great care in emphasizing that the new product is not a fertilizer. The company further emphasized that use of the conditioner

would have no diminishing effect on the use of or need for fertilizers in agricultural practices. Yet this emphasis did not prevent the impression, even among some well-informed groups, that "Krilium" and fertilizer are vaguely incompatible—and that use of "Krilium" might minimize or eliminate the use of most materials now commonly used as fertilizers.

The best answer to such temporary confusion is to re-state simply and factually what "Krilium" soil conditioner is and what it is not, what it *can* do and what it *cannot* do. And such re-statement should at the outset emphasize that even the data available on the product will be rounded out and strengthened by tests now under way in various sections of the country. Monsanto has asked approximately 100 technical cooperators in universities, agricultural experiment stations and other federal and state agencies with well-qualified personnel to do field work with the product. While available data is reasonably definitive and encouraging, and while the promise of "Krilium" soil conditioner in its proper applications is unquestionably great, many reports remain to be sifted and weighed. Knowledge of the new material is certain to increase rapidly within the next year. The company, in fact, is looking forward to accumulation of this new data. Any other position would be untenable.

What is "Krilium"?

AN attempt to describe "Krilium" soil conditioner briefly must necessarily omit data of significance to technically informed persons in the agricultural field. The need to present such information has been recognized by the company in a development data report, "The Application of Monsanto 'Krilium' For Improving Agricultural Soil Structure and Erosion Control." This report is available to anyone who wants it.*

Readers of AGRICULTURAL CHEMICALS are no doubt thoroughly familiar with the vast array of soil problems existent today. On the whole, they do not need the elementary but necessary description of these problems which many popular accounts of "Krilium" have contained. It may be more helpful merely to list the known achievements of the product, reiterate that technical data in connection with these achievements is freely available in the above mentioned report, and that additional data will be reported at intervals.

In its search for "Krilium," Monsanto's basic objective was this: to find a synthetic substitute for the polyuronides which normally occur plentifully in fertile, virgin soils, but which are scarce in silt and clay soils of poor structure. The company estimates that the soil *structure-improving* activity of one pound of its new conditioner is equivalent to that of the natural conditioners—polyuronides—produced from hundreds of pounds of organic manures or plant residues. "Krilium" also maintains its potency against bacterial decomposition at least 50 times as long as the polyuronides.

What Krilium Does

THE primary or direct effect of "Krilium" is to stabilize the natural soil aggregates against the dispersing or slaking action of water. It is only as the result of this primary effect that secondary effects or benefits occur. In tests, the latter have included improved soil aeration, improved soil moisture relationships, better soil workability and improved yields.

It is important to understand that these benefits result from *improved soil structure*. "Krilium" supplies no nutrients or trace minerals to plants or crops. Its effect is also quite different from those of known chemical supplements, such as limestone, which sweetens or neutralizes acid soil.

Complements Fertilizer

MONSANTO scientists are studying several interesting aspects of the relationship of "Krilium" soil conditioner and fertilizer. As soil structure is improved through use of the new conditioner, crops will grow faster and plants will be larger. Therefore, they will consume and require more nutrients, and it is logical to assume that larger quantities of fertilizer will be necessary. Improvement in soil structure will also increase the *effectiveness* of fertilizer. And since the use of "Krilium" will lead to increased root structure and plant growth, application of the product itself will tend to build up organic matter in the soil. These relationships are still under study, but results thus far strongly indicate that no conflict will exist between fertilizer and "Krilium."

Apart from the agricultural field, an example of the integrated effect of "Krilium" and fertilizer can be found in the application of the new conditioner in erosion control. Here "Krilium," grass seed and fertilizer can be applied to slopes and freshly graded areas from mobile equipment in a single operation, by means of a water spray. Or "Krilium," seed and fertilizer can be dusted simultaneously on the surface by means of ordinary mechanical spreaders at the rate of approximately one pound of "Krilium" for every 100 square feet to be treated. The conditioner holds seed and soil in place while grasses or legumes are germinating and establishing themselves.

It is probably dodging the issue to say that ultimate sales of "Krilium" soil conditioner will have no effect on sales of fertilizer. Both products have important roles to fill; both will be bought and used, in many cases, by the same consumer. But the soil structure improvement brought about by "Krilium" will, in the final analysis, probably increase sale of fertilizers. Plants and crops will perennially require adequate nutrients, just as they should be given a soil of the best possible structure in which to grow.

The objectives in the use of "Krilium" soil conditioner and fertilizer are, in a very real sense, completely compatible. Both products, when applied with technical accuracy under proper conditions, result in better use of available soil—and increased soil productivity.★★

*Copies of the report may be obtained by writing C. P. Zorsch, Organic Chemicals Dir., Monsanto Chemical Co., 1700 S. Second St., St. Louis 4, Mo.

Soil Use of Insecticides

THE subject selected for discussion here, that of insecticide-fertilizer mixtures and their use for soil-pest control, is one of our most controversial problems. Part of the controversy, without doubt, is due to the fact that the naturally long period of time required for a new practice of this type to become established was materially shortened by public demand, with the result that the practice became almost universally accepted before all the facts were in. As is often the case with the premature acceptance of a promising idea, some individuals ran into unexpected trouble and the whole idea was condemned. It has often been said that if benzene hexachloride had not come along when it did, we would probably not be nearly so concerned about soil-insecticide problems. It should not be construed that materials following BHC were free from suspicion by any means, but our experiences with benzene hexachloride have definitely influenced adversely our thinking on soil-insecticides in general.

The feasibility and desirability of using insecticide-fertilizer mixtures for the control of wireworms, seed corn maggot, cabbage maggot, the southern corn rootworm and numerous other soil pests cannot be covered by one answer or discussed as one problem because there are a number of aspects to it. In the first place, we list it as a problem dealing with insecticide-fertilizer mixtures when it should rightfully, in the majority of cases, be considered on the merits of the insecticide alone. In other words, if fertilizer-insecticide mixtures were never even heard of, we would still run into occasional trouble because of a faulty selection of insecticide. The only way fertilizer enters the picture is that, through mixing the two ingredients, there is a greater tendency to use the mixture as a fertilizer, *per se*, and thus encroach on the most dangerous way of applying it insecticidally, namely, in the row. Secondly, we often condemn its acceptance without attempting to be specific about what its intended use will be, whether on corn or an edible root crop such as potatoes. And thirdly, some importance should be attached to the fact that it will be used only occasionally and, in many cases, in a manner which has been found to be acceptable, as for example, a broadcast treatment of chlordane-fertilizer mixture for the control of wireworms on potatoes.

The practice of controlling soil pests with insecticides, whether applied alone or in a mixture with fertilizer, has had an interesting history during the last 6 or 7 years. A brief review of it might be very appropriate in order to bring into focus the problem as it exists today. Prior to the advent of synthetic organic compounds, we depended largely on cultural practices, effective in only specific cases, and soil fumigants which ranged anywhere from $25 an acre on up to $100 or more for adequate control of wireworms.

DDT opened up new possibilities, but it was not the panacea we were looking for in wireworm control, which was and is still the most important soil pest. Then benzene hexachloride appeared and the results of our experiences with it are well known to everyone. A material had finally been found which provided excellent, inexpensive control of wireworms, but the attending secondary problems of phytotoxicity and off-flavor brought about heavy criticism. Our conceptions of an ideal soil insecticide were altered drastically then and there and a tremendous amount of work went into the efforts to purify the gamma isomer of BHC in order to eliminate off-flavor and smell. Lindane, a name coined for the essentially pure gamma isomer, in various formulations did not remove the undesirable features of BHC.

Following this, there appeared another chlorinated hydrocarbon, chlordane. This met with considerably greater success and, as far as most individuals are concerned, chlordane was accepted as the best available soil insecticide. However, off-flavor, but not a pronounced phytotoxicity, has been reported for potatoes treated with chlordane in Connecticut, New York and New

by

Victor A. Tiedjens

Formerly of Virginia Truck Farm Experiment Station, now with Na-Churs Plant Food Co., Marion, Ohio.

Jersey. It was n t a marked off-flavor in the sense of BHC, but it did occur under some conditions, especially when applied to the row. New York State officially recommended chlordane for wireworm control in potatoes in 1951 with the proviso that it should not be applied in the row with fertilizer—a practice which has recently become popular with growers.

Due to the lack of a pronounced toxic action to seedlings and growing plants, chlordane soon became widely accepted for use on crops which involved no risk of off-flavor, such as corn, and as a public service, fertilizer concerns soon made available mixtures of fertilizers and chlordane. But the possibility of following corn with a susceptible edible root crop, as well as the possibility of misapplication of fertilizer-insecticide mixtures to potatoes and similar crops, caused concern in a numer of states and the practice was either forbidden or regulated through special labelling or other restrictions.

It is suspected that the concern which attends the application of insecticide-fertilizer mixtures is based more on possible off-flavor than on any other single factor, but it remained for a resolution adopted by the Southern Feed and Fertilizer Control Officials, at a recent meeting at St. Petersburg, Florida, to point out the association of our present uncertainty and the long-lasting nature of such materials in the soil. We have thus completed the cycle and return to the original contention, mentioned earlier, that we are unable to settle any issue based on residual insecticides until an official yardstick is provided.

Up until now, the problem has been one of off-flavor, objectionable odor, or toxicity to growing plants. The possibility of contamination of edible root crops grown in insecticide-treated soils has now been advanced and it remains to be seen what disposition the Food and Drug Administration wishes to make of it.

Developments within the past two years have shown that aldrin and dieldrin are excellent soil insecticides. It is generally conceded that they will replace chlordane for wireworm and general soil pest control. Dieldrin is, for all practical purposes, a refined form of aldrin and because of the added cost of purification, it is more economical to use aldrin. In light of the fact that compounds of more recent origin eliminate, to some extent, many of the objectionable features of their predecessors and are generally backed up by more authentic data, the balance of this paper will deal entirely with aldrin formulations for soil pest control.

Problems of Mixtures

IT was stated earlier that the feasibility of insecticide-fertilizer mixtures for soil pest control should depend largely on the qualifications and properties of the insecticide element of the mixture. Most insecticides are compatible with most fertilizers and aldrin-fertilizer mixtures have shown no loss of potency during storage.

The crux of the problem is what happens after the insecticide is mixed in the soil in which plants are to be grown. It is absolutely essential that the compound be studied with regard to: (1) its toxicity to plants growing in treated soils; (2) its residual nature or its long-range effects upon crops which are likely to follow treatment by several years; (3) its effect on beneficial soil organisms; (4) its deleterious effects on edible plant parts—sush as off-flavor or objectionable odor; (5) its possible translocation to other parts of plants and (6) the residues resulting from plants having grown in treated soils. It takes years of study to accumulate data on some of these points, but it is quite evident that certain ones of them are of more immediate concern to regulatory officials than others which quite clearly should be judged strictly from the farmer's point of view.

In spite of any benefits gained by a grower using insecticide-fertilizer mixtures, if the crop grown is unfit for human consumption because of flavor impairment or toxic residues on the food produced, regulatory officials would be justified in curtailing the practice. If, however, food can be produced free from such objections, even though a slight loss of stand might result from an initial toxicity to the plants, that should be a matter for growers to decide. In a great many cases, soil treatment means the difference between success and a complete failure so that a partial loss in stand is nothing compared with the overall savings made. This may sound like hedging but it does seem only fair for final judgment to be confined to the proper fields of influence.

Aldrin has been tested extensively throughout this country and elsewhere and there is considerable data to support the belief that it will ultimately replace chlordane as the insecticide most commonly used for soil pest control. The following briefs are based on a review of 38 references covering work done at 14 state experiment stations, Canada, Hawaii, Puerto Rico, a comprehensive report on investigations conducted by the Bureau of Entomology and Plant Quarantine and reports submitted to the Food and Drug Administration by the Julius Hyman Company, manufacturer of aldrin and dieldrin. A special appendix has been prepared to include data taken from the above references and frequent mention will be made to these tables. Much of this information is not for publication.

Toxicity to growing plants. It should be clearly understood at the outset that the amount of aldrin required for the satisfactory control of soil insects is approximately half that of chlordane, or roughly 2 to 3 pounds per acre. On heavy, organic soils this is usually doubled but in most cases, 3 lbs. per acre is considered a normal application. During the investigational phase of this work, most workers greatly exceeded the amounts normally required and the literature is full of such references.

It is only natural that one of the first soil pests against which aldrin should be studied is the wireworm, many species of which are economically important. Among the leaders in this field are the New York Experiment Station at Cornell, the Sub-Tropical Experiment Station in

Homestead, Florida, the University of California at Davis and the Everglaes Experiment Station in Belle Glade, Florida. Work at these places included tests on potatoes, sugar beets, lima beans, field corn, lettuce, broccoli, sweet corn and sugar cane with the dosage of insecticide ranging from 1 to 10 pounds. In no case was it reported that sprouting of tubers or germination of seed was adversely affected.

In Manhattan, Kansas, a field was divided into strips, one of which received 100 pounds of aldrin per acre, and 13 varieties of plants were grown. This dosage probably exceeds by 20 to 50 times the amount of aldrin required for practical insect control. Lettuce and bean plants were the only two of the 13 varieties tested to show any effect of aldrin at this extreme level of application. The germination of the lettuce seed was reduced slightly and the emergence of bean plants was delayed 2 days. The growth and development of these two varieties was likewise somewhat retarded. Tobacco plants were unaffected; in fact, development was increased somewhat.

In Virginia, peanuts grown in soils receiving from 2 to 5 pounds aldrin per acre for the control of diabrotica and strigoderma larvae showed no effects from treatment.

Perhaps the most extensive and intensive work done on this phase of the problem is that reported from the Iowa Agricultural Experiment Station. In determining to what extent soil insecticides either prevented or retarded germination and seedling growth, aldrin, at from 2 to 128 pounds per acre, together with fertilizer was added to the experimental flats, which were then seeded with the test plant varieties. This is a voluminous piece of work and for the sake of brevity, table 1 shows the number of plants emerging and the average weight (in parenthesis) in grams per plant for no aldrin, 2, 4, 64 and 128 pounds per acre respectively. This is conclusive proof of the general lack of phytoxicity of aldrin at the levels normally used for pest control. Some plants are bound to be more sensitive than others, but there appears to be little cause for alarm in ever running into anything serious. These figures show the extreme sensitivity of honey sorghum to aldrin at concentrations slightly in excess of what is normally required and, as an "indicator" crop we may find this plant useful in future work.

This by no means exploits the field regarding the work done with aldrin on the many crops under test, but the general trend of safety to plants seems well established. One could comb the literature and observe dozens of references to work on onions, cabbage, radishes and others which are susceptible to maggot attack, but the story is the same: Adequate insect control and no phytotoxicity at dosages within reason.

The Washington Experiment Station at Puyallup, Washington, reports an interesting development on radishes grown in soils treated with various soil insecticides. The abnormal condition was described as an extra small radish growing on the root about ⅛ - ½ inch from the base of the normal radish. Aldrin in this case was used at 2 pounds per acre for maggot control and a brief tabulation of abnormal radishes as they appeared in the various treatments was: Aldrin 1; chlordane 2: dieldrin 2; lindane 31; parathion 2; and untreated check-1.

Residual Nature of Long-Range Effects. Inasmuch as aldrin does not exhibit any marked initial toxicity to growing plants and since many of our most important soil pests require treatment only every 3, 4 or 5 years, it is doubtful if soil accumulations will ever be a source of anxiety. Possible soil accumulations, however, cannot be ignored. The data in support of the residual life of aldrin will undoubtedly be more abundant in the near future. It appears that aldrin does not possess the long life of DDT.

In work being done at the Federal Japanese Beetle Laboratory, Moorestown, New Jersey, soils treated with 3 pounds of aldrin showed a loss of 2.07 pounds, or 69%, from the upper 3 inches of soil after a period of 7 months. The device used to measure this loss was to place a number of 3rd instar larvae in the soil samples and compare the mortality with that obtained from samples of known concentration. Aldrin at 3 pounds per acre in 29 different soil types, collected from 6 northeastern states, produced a predetermined mortality of 98% in 28 out of the 29 in 1½ weeks. Only one soil type required a longer period of time.

In one experiment at the University of California at Davis, aldrin was applied at 5 and 10 pounds per acre in the fall of 1948 to study the effect on wireworm survival and lima bean injury in the years to follow. Wireworm control was still 100% in June, 1950 for the 10 pounds per acre plots. It had dropped

(*Turn to Page* 118)

TABLE 1

Number of Plants Emerging, and average weight in grams per plant (in parenthesis)

Treatment	Corn	Soybeans	Barley	Oats	Sorghum	W. Wheat	Buckwheat	Flax	Rye
Sand and Fertilizer	99 (2.41)	20 (1.35)	89 (.29)	99 (.21)	88 (.17)	74 (.21)	87 (.29)	84 (.08)	98 (.12)
Aldrin 2 lbs. per a.	98 (2.32)	20 (1.37)	96 (.28)	98 (.20)	82 (.17)	87 (.19)	94 (.23)	83 (.08)	96 (.10)
Aldrin 4 lbs. per a.	98 (2.44)	19 (1.16)	93 (.24)	79 (.19)	85 (.15)	82 (.18)	93 (.23)	83 (.08)	96 (.09)
Aldrin 64 lbs. per a.	94 (1.74)	9 (0.62)	90 (.18)	31 (.17)	54 (.14)	72 (.18)	62 (.16)	85 (.08)	0 (0)
Aldrin 128 lbs. per a.	97 (1.84)	16 (0.80)	61 (.17)	17 (.15)	53 (.14)	80 (.12)	47 (.16)	83 (.07)	0 (0)

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- S-W Flo-Mulsion (Dormant oil spray)
- S-W Karbam Black (Ferbam)
- S-W Karbam White (Ziram)
- S-W Mulsoid Sulfur (Micronized sulfur)
- S-W Sulfo Sulfur (Microfine sulfur)
- S-W Safe-N-Lead (Zinc safener)
- S-W Sprolastic (Spreader and sticker)
- S-W Sprod-Rite (Spreader and sticker)
- S-W Summer Mulsion (Summer oil spray)
- S-W Stop Drop (Naphthalene acetic acid)

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Control of Woody Plants with

HERBICIDES

by
C. E. Fisher*
Texas Agricultural Experiment Station
Spur, Texas

WIDESPREAD interest has now developed in the use of chemicals to control woody plants on range and pastures, right-of-way of highways, transmission lines and railroads, forest plantations, land reclamation sites and for eradication of poisonous plants as well as those acting as hosts to various disease organisms.

The chief chemicals used by research workers and commercial operators are 2,4-D, 2,4,5-T, mixtures of 2,4-D and 2,4,5-T, and ammate. These materials, with the exception of ammate, have been applied effectively under favorable conditions by airplane spraying equipment, knapsack sprayers, low and high volume ground spraying equipment. Cut surfaces of plants have also been treated with special applicators. Ammate has been used as a high volume foliage spray and in concentrated solutions or as crystals for treatment of frills and cut surfaces.

Results of nearly all research workers indicate that for basal applications and dormant season treatments oils are superior to water or oil-water emulsions as diluents for 2,4-D and 2,4,5-T. Moreover, it appears that the low volatile ester formulations are at least equally effective and much less hazardous to nearby valuable plants than the high volatile esters.

It also appears that different plants have optimum rates of chemicals for the various methods of application. Increasing the rates of chemicals above the optimum amounts seldom increases effectiveness of the treatment. With the basal method of application, further information is needed on the most desirable concentration and volume of diluent require to control sprouting shrubs.

Further development in control of woody plants appears to be dependent on more thorough knowledge of the vegetative regeneration processes of various species, modes of entrance and path of movement of toxic chemical during the summer and winter seasons. In addition, a better understanding of the characteristics of different chemicals and formulations must be developed if most efficient use is to be made of those materials to control woody plants.

Results with the three most promising methods of applying chemicals for the control of woody plants are summarized from reports of investigators and commercial agencies in the Southern Weed Conference area.

Foliage Apppication

AMMATE, 2,4-D and 2,4,5-T may be used effectively to control woody plants. In areas where mixed brush prevails, ammate and mixtures of 2,4-D and 2,4,5-T appear most effective while for stands of one species of brush, 2,4-D and 2,4,5-T show more promise when used alone.

For ground applications, complete coverage of foliage and stems is essential with solutions of 2,4-D and 2,4,5-T containing 1½ to 3 pounds acid, (depending on species treated) in 100 gallons of water when the plants are in full leaf stage and in vigorous growth. For the more resistant species it may be advisable to use oil-water emulsions or oils as carriers for the chemicals. Overall dormant sprays show more promise when 6 to 8 pounds acid of 2,4,5-T or 8 to 10 pounds of 2,4-D and 2,4,5-T as ester formulations are applied in 100 gallons of oil carriers to above ground plants parts.

The use of low volatile esters together with equipment delivering coarse droplets at low pressure should reduce loss of chemicals and hazards of drift to susceptible crops and valuable plants. The ester formulations of 2,4-D and 2,4,5-T appear to be most effective for control of a wide range of woody plants.

Ammate offers satisfactory control of mixed brush when applied to the foliage and stems in a drenching spray at a rate of ¾ to 1 pound of salt per gallon of water. It is less hazardous to use in areas where susceptible crops are grown and may be used effectively over a greater portion of the growing season. On the other hand, it is less selective, more corrosive and greater amounts of bulk materials must be handled. The addition of a spreader-sticker often improves the effectiveness for control of woody plants.

For airplane application, ¾ to 1 pound acid of 2,4-D ester in an oil-water emulsion at 1 gallon of diesel fuel and 2 gallons water per acre, or in 3 gallons of diesel fuel, is the suggested treatment for the control of sand sage brush. The application of chemicals should be made

*Paper delivered at Southern Weed Conference, Atlanta, Ga., February 6, 1952.

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Reviewing 35 years of

Progress in Entomology

by

C. H. Alden*

George State Entomologist,
State Capitol, Atlanta

Retiring president, Cotton States
Branch, A.A.E.E.

LOOKING back over more than 35 years of entomological activity, one can see many advancements, not only in the science itself, but also in the facilities and equipment for both manufacturing and applying the chemicals used in pest control. From the viewpoint of one who has been in entomology since 1915, there appear still two outstanding needs, the meeting of which would be a long step in achieving an even greater distinction for the science.

These are the expansion of entomological activities so that every county in the nation will have at least one, and preferably more, entomologists; and second, to improve public relations so the needs for entomological work will be better known and appreciated by the public. That will be real progress.

As was stated at the beginning, the science of entomology has seen tremendous changes in the past 35 years. When the writer entered the field in 1915, conditions were far from good. A mild depression was on which made jobs of all kinds scarce indeed. And as for entomologists, nobody seemed to be interested in paying for their services. It certainly did not look then as if there was much opportunity in entomology, and that it was already overcrowded. This feeling was based on the fact that out of 32 scientists (including some Ph.D's) taking civil service exams, only one other person, a Ph.D, and myself, made the grade. The Ph.D got a full-time position, and the writer was awarded a part-time job for the summer.

Contrast the scope of entomology in that day with what the science is doing today! In 1915, the Bureau of Entomology had a staff totaling about 200 persons, and its headquarters were located in a small brick building near the main agricultural building, both of which have since been torn down.

It was at this time that the Plant Quarantine Act of 1912 was just beginning to function; but viewing those activities from the perspective of many years, the quarantine programs were comparatively simple and perhaps grossly ineffective. Contraband materials could be kept out of trade channels only if one had the cooperation of both the railroads and the post office, but the methods and equipment to implement enforcement of laws were primitive.

Today, of course, quarantines have been vastly expanded and improved and many of them have become uniform for both intra and interstate shipment. The machinery for enforcement of quarantine laws has been streamlined, with permanent staffs attached to areas where quarantines are in force.

Both the personal and the professional life of the entomologist have changed along with the development of the science as a whole. The average starting salary of an entomologist was around $100 per month in 1915, but the real problem was to find an opening. Some states did not even employ an entomologist, and the general public, if it so much as knew the word "entomologist", regarded such a person as some kind of oddity; an individual of freakish personality who spent most of his time racing through the countryside with a net trying to catch butterflies and other bugs.

Socially, too, the profession had its hazards. Although the federal government had instituted civil service, only a few of the states had adopted it. Neither was there any provision for pension or retirement for aging entomologists. Advancement was slow, and the entomologist in many cases, became a sort of "forgotten man," working year after year on the same salary.

But despite these conditions, there were some bright spots in the situation. Most of the entomologist knew each other personally and they enjoyed getting together to talk shop. The work was interesting and challenging, providing, of course, one was able to secure a regular job. In those days, too, a dollar was really a dollar; it would buy a lot of merchandise and there were no worries about income and withholding taxes, social security and retirement deductions from the paycheck. Neither did one have to risk his all driving an automobile on the job; in fact the transportation first furnished the

(*Turn to Page* 129)

*From paper before Cotton States Branch, A.A.E.E., Atlanta, Ga., February 4, 1952.

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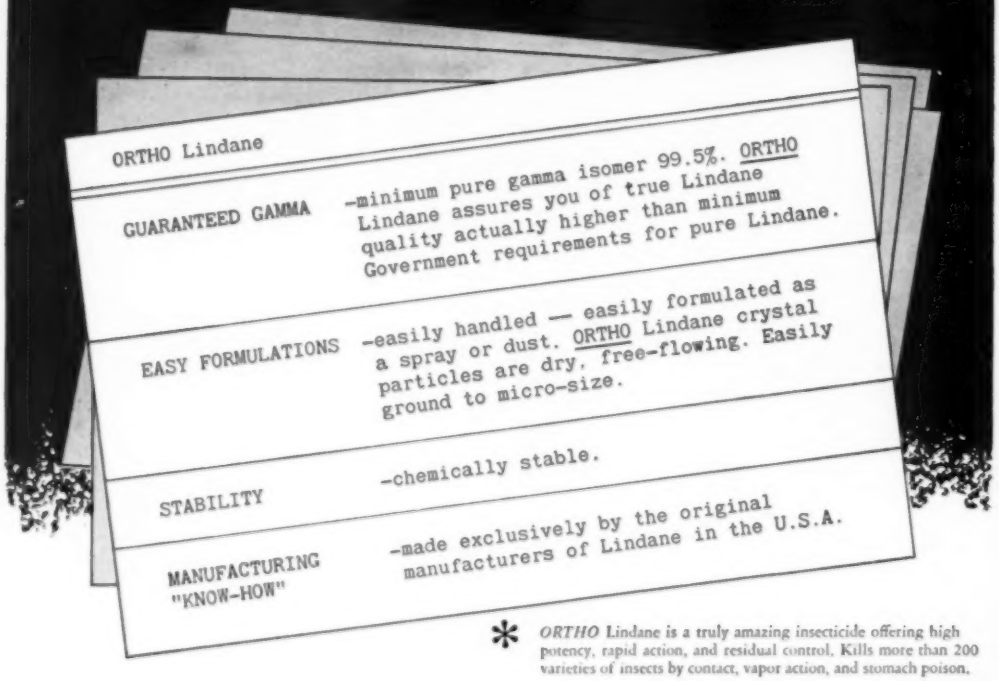
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St. Paul Host to March Meeting of NORTH CENTRAL ENTOMOLOGISTS

PROGRAM plans for the seventh annual conference of the North Central States Branch of the American Association of Economic Entomologists have been announed by J. H. Bigger, Urbana, Ill., chairman of the Program Committee. The meeting, scheduled to be held at the Saint Paul Hotel, St. Paul, Minn. March 27 & 28, will include the presentation of many technical papers, election of officers, and a talk by Dr. E. F. Knipling, president of the American Association of Economic Entomologists.

The subjects to be covered include fruit insects, forage and grassland pests; insects of man and domestic animals; extension; cereal crops insects; insects of vegetables and canning crops; household and stored products insects; insecticides and applicators; apiculture, and insects of forests and ornamentals.

R. C. Smith, Branch president, will be chairman of the opening general session which is to include a paper, "Absorption and Translocation of Insecticides in Plants" by T. C. Allen and J. E. Cassida; "How Insecticide Controls Affect the Manufacturer", by W. E. McCauley; and "Cooperative Insect Detection and Reporting Service", by Kelvin Dorward. Dr. Knipling is also scheduled to address the group at this session.

A panel discussion on the question of whether biological and chemical controls can work together, is to be held Thursday afternoon (March 27), with participants listed as R. Hutson, K. D. Arbuthnot and L. Haseman. This section, under the chairmanship of B. A. Porter, will head discussions of mites, codling moth resistance to DDT, and a paper, "Concentrate vs. Dilute Sprays" by O. H. Hammer.

R. E. Hill is chairman of the section on Insects of forage and grassland, which will hear reports by states, of the status of spittlebug range and abundance.

Another section on insects of man and domestic animals will have Ray L. Cuff as chairman. Dr. Knipling will speak on "Benefits of Ectoparasite Control on Livestock in the North"; W. N. Bruce will describe "A Device for Spraying Cattle Automatically"; H. Gunderson, "The Use of Low-Pressure Spraying in Livestock Pest Control," and J. A. Rowe will talk on mosquito control.

A panel on "Progress of Investigations on Control of Soil-inhabiting Pests" will be heard on Friday morning, March 28. C. C. Compton, F. W. Fletcher and J. H. Lilly will discuss soil treatments, seed treatments and cultural practices, respectively.

A second panel on "Status of Research on Control of Other Corn Insect Pests" will include observations by Wm. G. Bradley, D. A. Wilbur and George C. Decker on European corn borer, southwestern corn borer and chinch bugs, respectively.

"Insects of Vegetables and Canning Crops" is the subject of another section scheduled for Friday morning, with A. A. Granovsky as chairman. Included on this portion of the program is a discussion of "Control of Wireworms on Vegetable Crops"' by G. E. Gould; "Surface Applications for Union Maggot Control," C. C. Doane; "Six-Spotted Leafhopper in Relation to Purple Top," D. C. Drake; "Evidence of Resistant Cabbage Worms in Wisconsin," F. McEwen; "Results of Recent Corn Earworm Research," R. A. Blanchard; and "Thrips Control on Cucumbers," by L. B. Daniels.

Friday afternoon's session will include the final business session, presided over by President R. C. Smith. This session will include reports of the treasurer and committees, and presentation of new officers for 1952 and 1953.

J. E. Bussart is chairman of a section on "Insecticides and Applicators,"' featuring two panel discussions. The first of these, on new insecticides, will include the following: "Hydrocarbons," by L. K. Cutkamp; "Phosphates," by P. A. Dahm; and "Systemics," by W. W. Abramitis. The second panel will discuss residues, with three men covering the subject. These will include J. E. Fahey, "Residues on Corn Following Treatments for European Corn Borer"; J. M. Bann, "Residues on Legumes Following Treatments with Insecticides"; and C. J. Wienman, "Important Factors Commonly Overlooked in Evaluating Residues."

R. K. Chapman will follow with a paper on "Low-Gallonage Treatment on Vegetable Crops."

A concurrent session on "Insects of Forests and Ornamentals" is to be held Friday afternoon under the chairmanship of D. M. Benjamin. R. B. Neiswander will present a paper on "Emulsifiable DDT Sprays for Summer Control of Scale Insects"; W. D. Miller, "Biology and Control of Pine Tip Moths"; R. D. Shenefelt, two papers: "Soil Insecticides for Nurseries" and "Possible Vectors of Oak Wilt Disease"; A. C. Hodson, "Importance of Repeated Defoliation of Trees by In-

(Turn to Page 113)

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Factors Influencing the Efficiency of Fertilizer Conditioners

PART II

Part I of this paper, published in the February issue, discussed a number of conditioners as to their physical properties and effects on complete fertilizer mixtures. The article continues here as a discussion of other materials tested.—ED

Other Materials

STANDARD caking tests with other materials that might be expected to produce chemical reaction in the mixture containing 4.3% moisture revealed none that were as efficient in their anti-caking action as magnesium oxide or urea. Domestic *sulfate of potash magnesia* of the same particle size as the other ingredients of the mixture and used at the rate of 100 pounds per ton of final mixture gave an 8% reduction in the crushing strength of the fertilizer cake. Similar tests with other materials gave results as follows: *Hydrated lime*, 86% through 200 mesh, used at the rate of 20 pounds per ton of final mixture, reduced the crushing strength 16%; *Dolomite*, finer than 300 mesh used at the rate of 100 pounds per ton of final mixture, reduced the crushing strength 60%; at 50 pounds 36%; *Serpentine* finer than 325 mesh at the rate of 100 pounds per ton of final mixture, 14%; *Cyanamid* finer than 100 mesh at the rate of 20 pounds per ton of mixture, 8%.

Bag-Storage Tests

IN the early stages of this study plant-scale bag-storage tests were carried out in conjunction with laboratory caking tests during the production of several hundred tons of high-analysis mixtures at the Cambridge plant of the Eastern States Farmers' Exchange. Results of the bag-storage test correlated well with those of the laboratory test on individual samples. Variations in the moisture content, particle size of the raw material used, and the atmospheric conditions under which the product was bagged and stored in the plant-scale tests, however, interfered with the clear-out evaluation of some 9 different conditioning agents.

Caking of mixtures under commercial storage conditions occurs less readily than in laboratory caking tests. In the latter case, pressure applied in the caking bomb and the subsequent artificial drying of the cake, accentuate the severity of caking and thus aid in obtaining well-defined results. For example, the standard unconditioned 10-10-10 mixture may barely show signs of caking during bag storage when the crushing strength obtained under controlled laboratory conditions is 100 p.s.i.

From this it appears that satisfactory conditioning of the mixture requires the incorporation of a conditioning agent in amounts adequate under laboratory conditions to reduce the crushing strength of the cake to 100 p.s.i. or below. As applied to the reference mixture, it is estimated that inclusion in the ton formula, of 100 pounds of a conditioner capable of reducing the crushing strength by 34% or more, would provide the desired conditioning effect up to a maximum moisture content of 3.3%. With the possible exception of expanded perlite, none of the conditioners listed in Table 2, however, would condition the mixture satisfactorily at 5% moisture. Variations in moisture content, therefore, may explain the erratic behavior of conditioners under manufacturing conditions.

by
John O. Hardesty
and
Rikio Kumagai
U. S. Department of Agriculture, Bureau of Plant Industry Station, Beltsville, Md.

Discussion

HIGH absorption capacity appears to enhance the ability of finely-divided conditioners to adhere to and coat the surface of the fertilizer particle and to increase their conditioning value. For example, montmorillonitic clay, having a high absorption capacity, showed better coating power and better conditioning effect than kaolinitic clay of low absorption capacity. This effect is not as pronounced with conditioners possessing the same particle size as the other ingredients of the mixture, and in this case there appears to be no direct correlation between absorption capacity and conditioning effect. The tendency of some finely divided materials, such as talc, to cohere seems to inhibit their conditioning effect. In general, low apparent density of the conditioner tends to enhance conditioning effect, but this property

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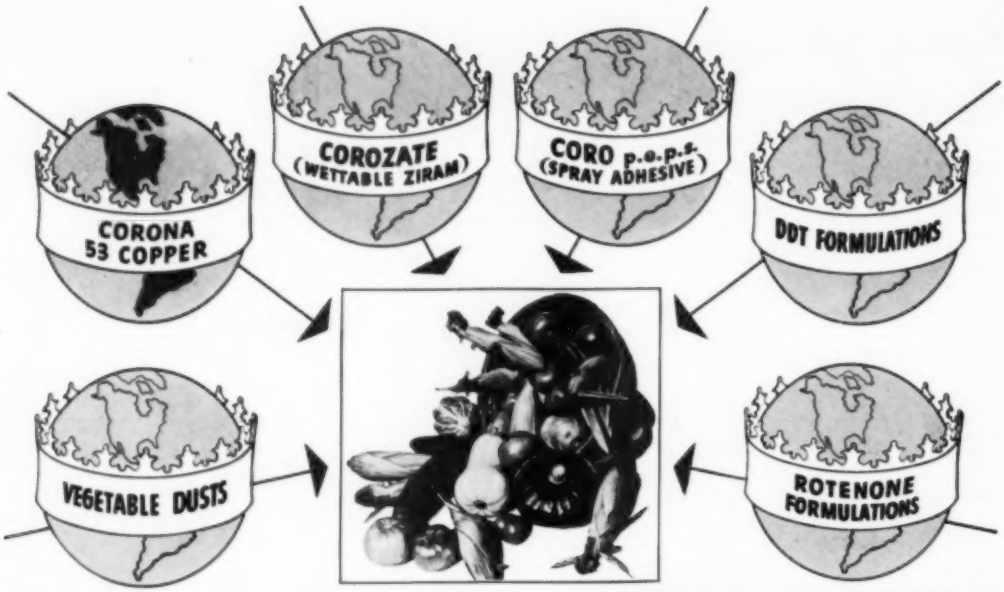

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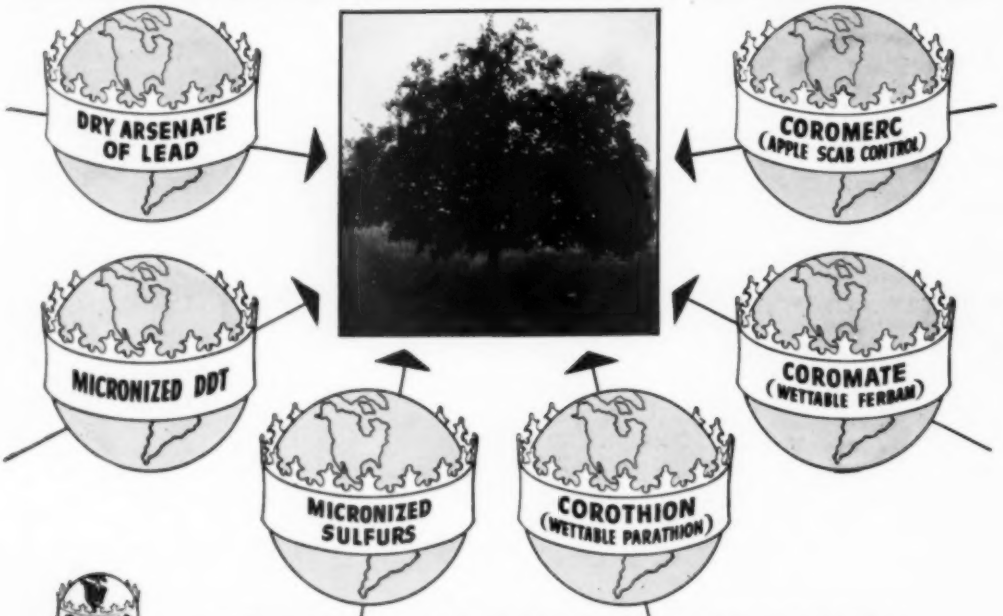

CORONA CHEMICAL DIVISION

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The Evaluation of Agricultural Emulsions

by

W. C. Griffin

and

R. W. Behrens

Atlas Powder Company
Wilmington, Del.

TO be of maximum value, agricultural emulsions in general must satisfy the following requirements: (1) they must be easily prepared (or diluted), (2) they must have a moderate stability to creaming (one to several hours), (3) they must show little or no oil separation, (4) they must be easily redispersed after creaming (24 hours standing, etc.), (5) they must behave similarly with water of different hardness. Therefore, in the manufacture of agricultural chemical emulsions or emulsifiable concentrates, or in studies of ingredients for them, a convenient and reliable means of laboratory evaluation of these properties is needed. The following test method has been found to be a valuable procedure for characterizing the behavior of most agricultural emulsions.

The most critical part of an emulsion test procedure is preparation of the emulsion. The ideal preparation system would duplicate field conditions as employed by the farmer. However, this is neither possible nor desirable. We know that: (1) the farmer will combine the ingredients in the most manual labor saving way, (2) his emulsification equipment is of doubtful efficiency, (3) agitation will usually be continued while the spray is applied, with possible interruptions. It is only too easy in a laboratory test method to exceed the degree of agitation common in field practice; hence, for this and other reasons the amount of agitation must be moderate and be most carefully controlled.

Observation of the emulsion so formed completes the evaluation and certain procedures and equipment, if used, will improve both ease and accuracy of this portion of the test.

The proposed method utilizes equipment available from a laboratory supply house*, requires approximately ten minutes total per sample being observed (of which the first few minutes are devoted to sample preparation and the remainder are spaced over the succeeding 24 hour observation period) and is sufficiently simple so that non-technical personnel may be taught rapidly its use with assurance of reliable results. When conducting a research study, it is necessary to observe the behavior of a formula with water of varying degrees of hardness. It may also be necessary to examine the effect of dilution ratio, the suitability of alternate ingredients, and other factors. Without a rapid and reproducible method of emulsion testing, such a program involves a prohibitive amount of laboratory work when such large numbers of formula changes are involved. Because of its simplicity, the proposed method permits the evaluation of a greater variety of conditions and formula changes within a given time which should result in more satisfactory formulations.

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Equipment (for about 20 tests per day)

Quantity	*Item*	*Catalogue No.**
4 dozen	4 oz. tall form jars screw cap	6284-B
2 dozen per day	Caps for above jars	2849
2 dozen	Pipettes, Mohr, 5, 10 or 25 ml. total capacity, depending upon dilution ratio used	8160
1	Dispensing burettes and reservoir Reciprocating type shaker. 1 in. stroke approx. 280 cycles per min.	8919-G
1	Automatic time switch 120 second range for above shaker	3650-F
1	Emulsion Viewer	4943-C
4 dozen	Emulsion viewing tubes	4943-J
1	Emulsion leveling tube connected to a laboratory water aspirator	

The burettes mentioned above are for dispensing distilled or hard water to the 4 oz. jars in the preparation of the emulsions. A burette-reservoir assembly should be provided for each type of water to be used in the study. Suitable burettes may be constructed from 1-⅛" diameter, Pyrex tubing approx. 2 ft. long to one end of which is affixed a three-way stopcock. Such burettes are easily calibrated and equipped with an external scale. Convenient reservoirs are Pyrex bottles of 5 gallon capacity affixed to the burettes with rubber tubing.

The leveling tube is a 12 inch length of 6 mm. Pyrex tubing with a right angle bend approximately 5 inches from the upper end, and attached to a laboratory water aspirator by means of rubber tubing.

Arranging Equipment

THE equipment may be mounted within an 8 to 10 ft. length of standard laboratory bench. It has been found expedient to provide a shelf about 16 inches higher than the bench level for the Emulsion Viewer. This provides a convenient height for the viewer and, at the same time, allows space for the shaker beneath the Emulsion Viewer. The burette and reservoir are mounted on the bench shelf behind the burettes. Bottles, tubes, caps, etc. may be kept in the drawers beneath the bench.

The automatic timer is set for a 30 second interval so as to provide the proper amount of agitation by controlling the duration of shaking at 1" stroke and 280 cycle/min. provided by the shaking machine.

Procedure:

Assemble sufficient clean jars, caps, pipettes, and viewing tubes for the number of emulsions involved. The proper volume of distilled or hard water is added to each bottle from the burette to give required dilution at a total of 100 ml. of emulsion. After all the jars have had water added, the concentrates or emulsions are pipetted into the jars, bringing the total volume in the jars to 100 ml. The jars are capped, placed on the shaker, and the shaker turned on by means of the timer push button. As soon as the shaker turns off (30 seconds) the emulsions are poured into the viewer tubes, (already placed on the rack) and the remainder of the emulsion discarded. An excess of emulsion is added to each tube and the excess immediately removed (the liquid level is adjusted to the top line, or 100 mark, on the glass scale) by means of the leveling suction tube which also eliminates any objectionable foam at the top of the tube. This represents zero time for the series of emulsions, and with a little training 21 emulsions can be poured into tubes and leveled within 3-5 minutes.

Subsequent observations will require about the same length of time for the entire series, therefore, possible time interval discrepancies between samples are minimized.

Observations of the emulsions are made with the light positioned behind the tube being examined. The lamp is lighted only during actual observation period to avoid heating the emulsion. Volume percent creaming and/or separation are recorded at elapsed times of ¼, ½, 1, 2, 3, and 24 hours. The samples are then discarded or redispersed by a single inversion cycle of the observation tube and readings are started again.

Bottle caps are discarded after a single use to avoid contamination. The mechanical shaker is essential for reproducible results since the vigor of agitation is critical except for a few cases. By the same token, the automatic timer provides a reproducible amount of agitation.

The emulsion viewer permits a precision of observations not previously obtained. A further refinement that may be of interest is the use of a controlled temperature during preparation and observation.

Summary: A method of examining agricultural emulsions is proposed. The procedure is built around commercially available apparatus. The basis of the test is a reproducible, controlled emulsion preparation technique that allows the preparation of as many as 20 emulsions at one time. By means of a new type observation rack the emulsions are examined with greater accuracy. The procedure is sufficiently simple that it lends itself to easy teaching to non-technical personnel with reliable results.★★

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The Listening Post

Fungicides Effective on Vegetable Crops

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Survey Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller

ACCORDING to George Swank, Jr., of the Florida Agricultural Experiment Station, "MC-2" (methyl bromide with 2% chloropicrin) and "OS-1199" (trans 1, 4-dibromobutene-2) have recently been found to be valuable materials for the control of damping-off organisms in celery seedbeds. The effectiveness of methyl bromide has been demonstrated by many workers. Disadvantages that confront the user of "MC-2" are its cost, necessity of an air-tight seal, and the limited area which can be treated at one time. Trans 1, 4-dibromobutene-2 can be applied without such disadvantages. Earlier tests have demonstrated the value of this material as a solid fungicidal and nematocidal soil fumigant in Fresno sandy loam soil.

Growers in central Florida double or treble the amount of seedbed acreage that would be necessary to set celery fields. This practice is necessitated by failure to control damping-off. The added cost in labor, materials, and seed is estimated to be $75 to $100 for each additional bed sown. The data thus far obtained at the Central Florida Experiment Station indicate that "OS-1199" is an economically good soil fungicidal fumigant that will control damping-off in celery seedbeds. This material was used as a solid on sandy soil.

A preliminary test was conducted during November and December of 1950 on a celery seedbed, using "MC-2" and "OS-1199." Results warranted further evaluation. A second test designed to include these and a number of other chemicals was conducted from January through April of 1951. Three replications of nine treatments, (Table 1) were used. Methyl bromide with 2% chloropicrin was applied with the use of a "jiffy" applicator under an air-tight seal of sisal kraft paper. The cover was raised 5 inches off the seedbed by a wooden prop to permit circulation of the gas. The "MC-2" flowed into a metal trough as it was released from the container. The cover remained on the treated area for a period of 48 hours. The seed was sown four days later. "OS-1199", "275 D", acetyl acetaldehyde, and acetyl formaldehyde were mixed with fine vermiculite and spread over the surface of the soil. The materials were tilled in to a depth of 3 to 4 inches.

Flake paraformaldehyde was used similarly but tilled in to a depth of 2 inches. "SR-406" (10% active) and "Spergon" (12% active) dusts were applied after the plants were ½ to 1 inch in height. Six applications were made at three-day intervals. Fine vermiculite was used in all treatments at the rate of 2 quarts per 40 square feet. The materials were used on a raised seedbed 4 inches x 4 feet x 300 feet, and the bed was covered with muslin cloth supported by "A" frames to reduce the intensity of sunlight falling on the germinating seed. The seed was sown on January 26, 1951, at the rate of 8 ounces per 1200 square feet. Water was circulated around the seedbed until the seed had germinated. The bed was then watered from overhead as often as required.

Results obtained with the use of the various chemicals at strengths given in Table 1, indicate that trans 1, 4-dibromobutene-2 and methyl bromide were significantly better than the other treatments for the control of damping-off organisms. Considerable damping-off occurred in the check plots and in many of the other treated areas. Individual plants selected from the "OS-1199", "MC-2", and check plots illustrate the increased root

TABLE 1

Treatment, rate of application of active ingredient, and disease rating obtained on sandy soil at the Central Florida Experiment Station when celery was used as a test crop.

Treatment[a]	Rate of Application of Active Ingredient	Disease Rating[b]
OS-1199	2 gr./sq. ft.	1.1
OS-1199	4 gr./sq. ft.	1.0
Flake para — formaldehyde	1 gr./sq. ft.	5.1
MC-2	1 lb./40 sq. ft.	1.7
275-D	4 gr./sq. ft.	4.3
SR-406, (10% active)	20-35 lbs./acre	5.6
Spergon, (12% active)	20-35 lbs./acre	3.9
Acetyl acetaldehyde	2 cc./linear ft.	4.8
Acetyl formaldehyde	2 cc./linear ft.	4.2
Check		4.7
L.S.D. 19-1		0.71

[a]SR-406 and Spergon dusts were applied after the plants were ½ to 1 inch in height. The rate of application was based on active and inert materials.
[b]The above disease rating was based on an arbitrary scale of 1 to 7, with 1 indicating little or no disease and 7 complete loss.
[c]The Shell Oil Company, Celanese Corporation of America, Dow Chemical Company, Mathieson Chemical Company, California Spray-Chemical Corporation, U. S. Rubber Company and General Aniline and Film Corporation, supplied the material used in this test.

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growth of plants in the treated over the untreated areas (Fig. 1). The plant from the check plot (Fig 1) is characteristic of many of the plants from the untreated beds in central Florida.

The root tips die back, destroying the region of cell division, thus resulting in an overall stunted plant. Species of three general types of fungi—*Rhizoctonia*, *Pythium*, and *Fusarium* — have been isolated from diseased root tips. These species have been tested and their pathogenicity confirmed. A portion of a celery seedbed illustrating the effectiveness of "MC-2" and "OS-1199" is presented in Figure 2.

No compound used in the tests was phytotoxic at the concentration given in Table 1.

According to the Shell Oil Company, the degree of mammalian toxicity of dibromobutene is not known. Data at present indicate that it possesses a high degree of toxicity. Care should be exercised in handling the material. The material is a lachrymator and therefore gives definite warning symptoms.

This report is preliminary and based on tests made from one season's data and limited to one area and soil type.

Disease Spread Halted

ELMER R. Roth, of the U. S. Bureau of Plant Industry, Soils, and Agricultural Engineering, states that the sapstreak disease of sugar maple caused by the fungus *Endoconidiophora virescens*, results in grayish to reddish areas in the sapwood of infected trees. In addition to causing sapstreak, the fungus is a common cause of sapstain in hardwood lumber throughout the East.

Large merchantable trees are killed by the disease. The causal fungus is readily isolated from the discolored areas in standing trees or in freshly cut lumber. After infected trees are cut, the fungus fruits abundantly on the exposed discolored areas of the logs or on the sawed lumber, causing extensive black discolorations. So far as is known, the sapstreak disease on sugar maple is confined to the Big Ivy Section of the Pisgah National Forest, near Barnardsville, North Carolina. Isolated cases of a similar disease have been found on yellow-poplar in northeastern Tennessee and near Asheville, North Carolina.

Most of the sugar maple lumber cut in the affected area is used locally. Occasionally, shipments are made to outside destinations, perhaps even into other maple-producing areas, raising the question as to whether the surface fruiting of the fungus already

Figure 1

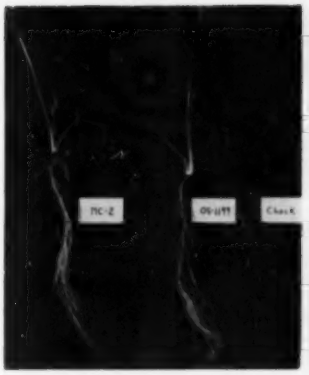
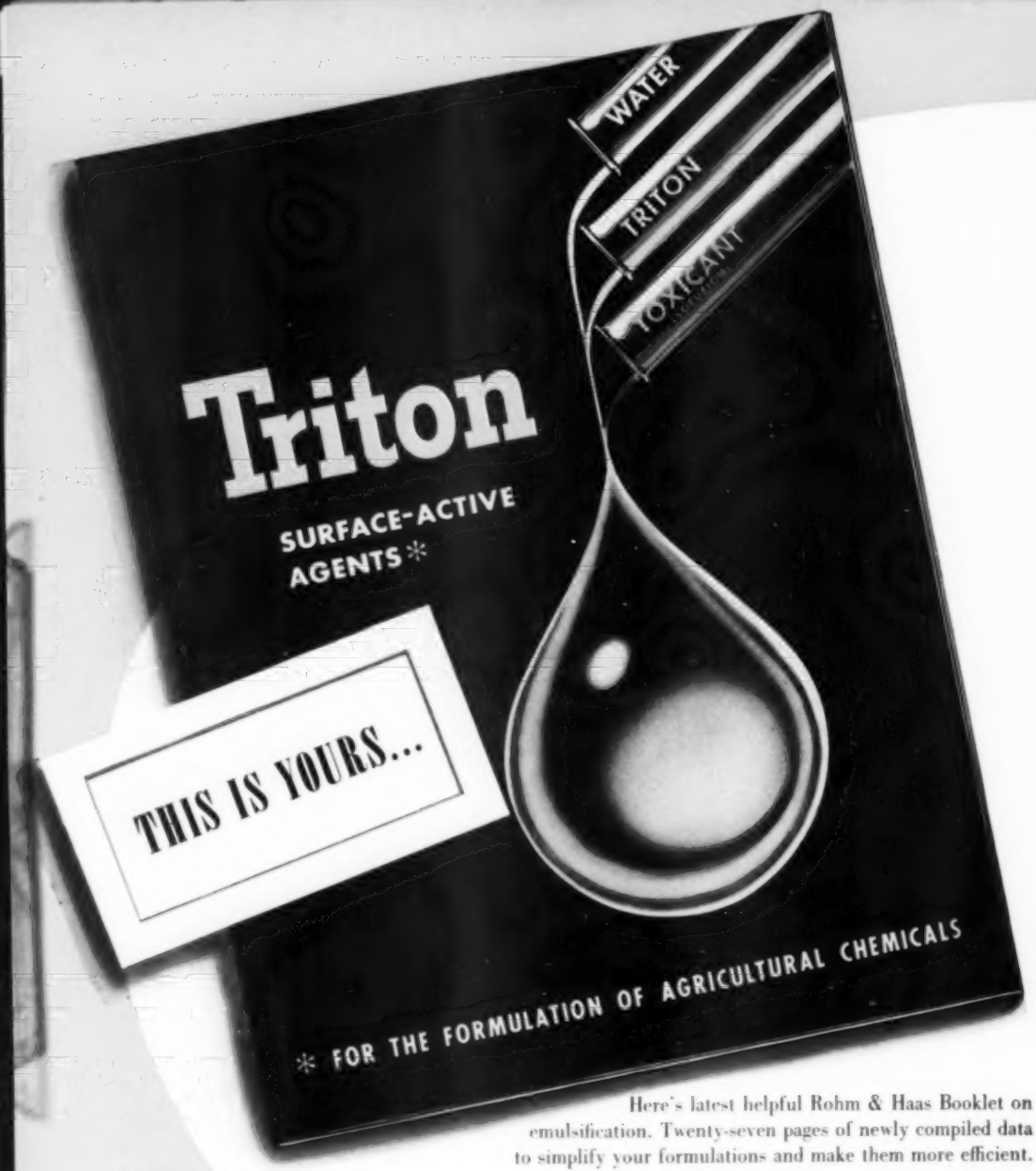


Figure 2

TABLE 2
Recovery of Endoconidiophora virescens from lumber cut from sapstreaked trees[a]

Treatment	Boards yielding positive Endoconidiophora virescens isolations							
	Prior to treatment		After treatment					
	June 15 1949[b]	June 27 1949	July 8, 1949		August 11, 1949		Sept. 9, 1949	
	Wood	Spore	Wood	Spore	Wood	Spore	Wood	Spore
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Permatox 10-S								
Bulk-piled	80	—	—	0	0	—	0	—
Sticker-piled	60	—	—	0	0	—	0	—
Piled green								
Bulk-piled	80	—	—	60	—	0	0	0
Sticker-piled	80	—	—	60	—	0	0	0
End-racked	60	—	—	40	—	0	0	0
Bulk-piled, then kiln-dried on June 27	80	100	0	0	0	—	0	0

[a]Each treatment represented by 20 boards, and each period 5 boards were sampled from each treatment.
[b]Boards fresh from the saw and before treating or piling.



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present in the logs when the boards are sawed might spread the fungus to other regions. A study was made to find out the length of time the fungus and its spores would remain viable in or on cut lumber, under the conditions of the storage methods commonly used, including spraying with a sapstain preventive.

In June 1949, ten logs were selected from recently cut sapstreaked trees. Wood cultures were made from near the ends of several of the logs and the fungus was easily isolated from the discolored areas.

The logs were then cut into 1-inch boards of varying widths and from 6 to 10 feet in length. Twenty boards were used in each of six treatments, or 120 boards in the experiment. As the boards were removed from the saw, cultures were attempted from every fourth board. All wood cultures were made by sawing a section from the board and culturing from the center of the split section. As soon as the cultures were made, 40 of the boards were sprayed with a solution of "Permatox 10-S" (active ingredients, borax and sodium pentachlorophenate, manufactured by Chapman Chemical Company, Memphis, Tennessee) at the rate of 10 pounds per 100 gallons of water. Twenty of the treated boards were bulk-piled and 20 were sticker-piled. The remaining 80 untreated boards were handled in the following ways: 20 boards bulk-piled green; 20 boards sticker-piled green; 20 boards end-racked green; and 20 boards bulk-piled for two weeks, then kiln-dried. With the latter, spore cultures were attempted immediately before, and spore and wood cultures immediately after kiln-drying. Spore or wood cultures were attempted from five boards in each treatment one, two, and three months after the boards were sawed.

The fungus was obtained from 73 percent of the cultures attempted from the freshly cut boards. For the kiln-dried boards, positive cultures were attempted immediately before drying (Table 2). After kiln-drying, the fungus was not obtained from either spore or wood platings.

Boards treated with "Permatox 10-S" did not yield positive cultures from either spore scrape or wood cultures, at any time after treatment. These boards remained bright and free of obvious surface fungus growth throughout the experiment, as compared with the dense black mycelial growth on the untreated air-dried boards. Vapors from these treated boards prevented fungus growth on several layers of boards used in covering the pile. There was no apparent difference in subsequent staining between the bulk-piled and sticker-piled treated boards.

The end-racked boards yielded positive spore-scrape cultures from 40% of the boards sampled at the end of

(*Turn to Page 123*)

Corn Borer, Grasshoppers, Bollworm Reported

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is connected with the department of Insect Pest Survey and Information, Agricultural Research Administration, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Washington. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the United States.

By Kelvin Dorward

IN 1951, surveys to determine the abundance of the European corn borer were conducted in 700 counties by Agricultural agencies within 26 States. The survey revealed the borer to be in 51 counties not previously known to be infested. Distribution of the newly infested counties is as follows: 1 county in Alabama, 2 in Kansas, 1 in Minnesota, 16 in Missouri, 1 in Montana, 4 in Nebraska, 1 in North Carolina, 3 in North Dakota, 7 in South Dakota, 2 in Tennessee, 10 in Virginia, and 3 in West Virginia.

The overall picture throughout the infested area is that the European corn borer remained at a low level of infestation and was less abundant in 1951 than in 1950. The general average of the borer population in the North Central States in 1951 was lower than 1950. However, the insect was more numerous in parts of South Dakota and southwestern Iowa. An area comprising adjoining sections of southwestern Minnesota, eastern South Dakota, and extreme northwestern Iowa was the most heavily infested in the Corn Belt during 1951 but was still lower than in 1950.

European corn borer population trend was upward in the Eastern States. Increases from 1950 to 1951 occurred in the surveyed parts of Pennsylvania and Virginia and in Delaware, Maryland, and New Jersey. The southwestern and southeastern sections of Pennsylvania were the most heavily infested areas in the East.

The accompanying map (page 73) indicates the abundance of the borer in 1951 for counties from which figures are available.

Grasshoppers in 1952

THE outlook of grasshopper infestations for the country as a whole is downward for 1952, in comparison with recent years. Grasshopper populations in 1951 were not exceptional in most areas. Weather conditions were credited with limiting grasshopper development in several States. In North Dakota, the expected hatch did occur, but a long, cold, wet period was responsible for destroying most of the insects. The same situation evidently developed in Montana and Minnesota. In Arizona, dry weather assisted greatly in limiting infestations. This was especially true on the San Carlos Indian Reservation where heavy egg deposits were known to exist. The drouth dessicated the eggs to such an extent that no economic infestations developed.

In only a few areas was there an increase of grasshoppers in 1951

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over the previous year. In many of the range areas in Nevada, several species became increasingly important. Threatening, to very severe infestations developed in eight of Nevada's 17 counties. Large sections of western Nebraska range lands supported high populations of grasshoppers. Second generation 'hoppers were responsible for increased infestations in western Kansas. These grasshoppers were also numerous in the Texas and Oklahoma panhandles, eastern Colorado, and western Nebraska.

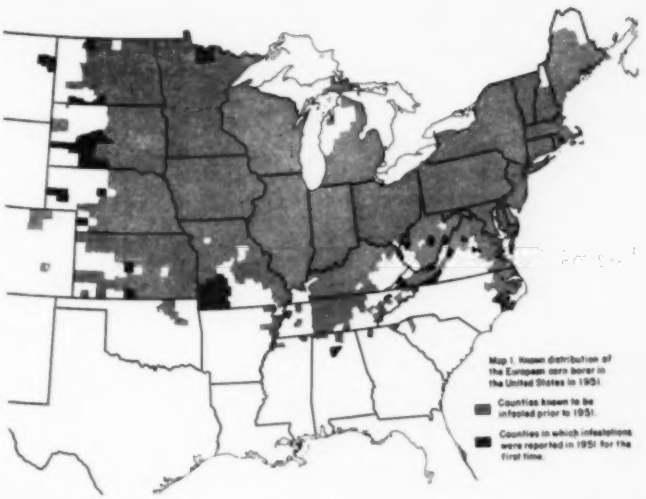
In the Klamath Basin of southern Oregon and northern California, severe grasshopper infestations developed on range and crop lands. The high populations present in Idaho for several years, did not lessen during 1951. Damaging populations of grasshoppers are present in some of the Forest Service range lands in the Big Horn mountains of Wyoming. There is an increase in the numbers of grasshoppers in central South Dakota where heavy populations were present from 1944 through 1946.

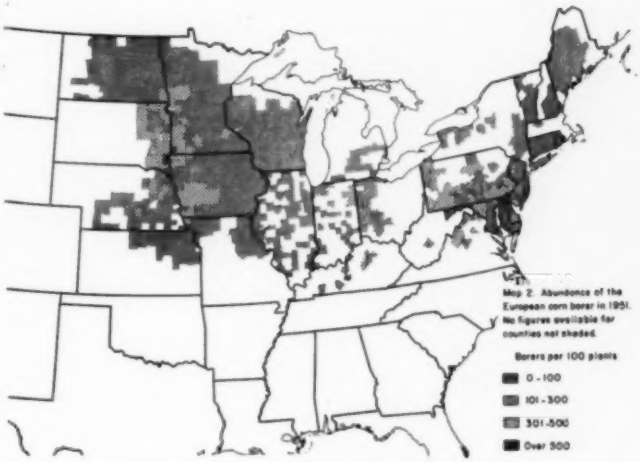
Population decreases were noted in Arizona, Montana, North Dakota, Minnesota, Wyoming, Texas, New Mexico, and parts of other States.

Pink Bollworm Spread

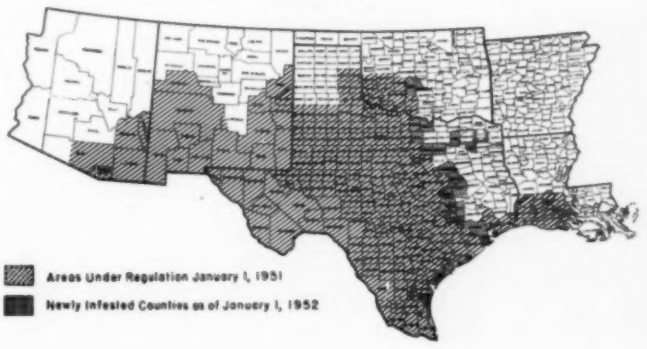
INSPECTIONS of the 1951 cotton crop for pink bollworm infestations showed general infestations of that insect in many of the regulated areas, as well as some spread eastward in Texas and Oklahoma. Early inspection showed a marked decrease in some counties of south Texas that were heavily infested in 1950, but later inspections showed a heavy build-up in late harvested fields and those where field cleanup was delayed. In many other counties in this section the infestation increased, especially in the group of counties along and near the coast north of Corpus Christi. Inspection of material collected since field cleanup, indicates there will be a tremendous carry-over for the 1952 crop.

(*Turn to Page 87*)


Map 1. Known distribution of the European corn borer in the United States in 1951.
Counties known to be infested prior to 1951.
Counties in which infestations were reported in 1951 for the first time.


Map 2. Abundance of the European corn borer in 1951. No figures available for counties not shaded.
Borers per 100 plants
0 - 100
101 - 300
301 - 500
Over 500

PINK BOLLWORM REGULATED AREAS
JANUARY 1, 1952



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Suppliers' Bulletins

Edco Corp. Label File

Edco Corp., Elkton, Md., is making available a folder designed to carry a collection of sample labels for a complete line of agricultural insecticides, weed killers, etc. The first in a series of uniform labels, carrying approved data is being mailed with the folders. On the labels is pertinent information as to toxic hazards of the products, crop uses, recommended dosages, etc. Additional labels will be issued from time to time. Write to Edco Corp. for copies of the folder and sample labels.

•

Warfarin Film Strip Out

Wisconsin Alumni Research Foundation, Madison, Wis., has issued a film strip entitled, "Win the War Against Rats and Mice with Warfarin." It is in 35 MM size, for projection on a screen. It is not a movie, but is suitable for use in promoting the product. Write to the Foundation, P.O. Box 2059, Madison 1, Wisc.

•

New Payloader Available

The Frank G. Hough Co., 743 Seventh Street, Libertyville, Ill., recently announced that a new four wheel drive tractor-shovel "Payloader" is now available. The new machine (below) has a 1 cu. yd. bucket, four pneumatic tires all the same size, and rear wheel steer with a short wheel base. It is easy to operate and highly maneuverable, according to the announcement. The new machine is designed to dig, load trucks and other vehicles, to spread, level, skim carry and bulldoze and lift, pull and push. It was also announced that additional attachments are available for the machine.

•

New Thayer Filling Scale

Thayer Scale & Engineering Corp., Rockland, Mass., has introduced a new model filling scale, No. 400N. Fertilizers, chemicals, etc., may be automatically net-weighed and bagged at speeds up to 12 per minute for 50-lb. bags and 10 per minute for 100-lb. bags. Performance is guaranteed to be accurate to 0.1 pound, plus or minus, for any selected weight from 25 to 200 lbs.

•

Sprout-Waldron Brochure

Sprout-Waldron & Co., Inc., Muncy, Pa. has issued a new bulletin No. I-846, entitled, "More Effective Insecticides from Sprout-Waldron Blending Systems." It points out the difference between blending and mixing. "Intimate blending becomes increasingly significant with powder formulas 100 mesh and finer. It is especially indicated where liquids or fibers must be incorporated with fine powders as well," the brochure states.

The booklet pictures various "spatula tests" of different insecticidal materials and describes in detail, with illustrations and cut-away drawings, some of the machinery offered.

Write for your copy, care of Sprout-Waldron Co., Inc., 7 Logan Street, Muncy, Pa.

•

New Pennsalt Bulletin

The Agricultural Chemicals Division of the Pennsylvania Salt Manufacturing Co., Philadelphia, recently released a new service bulletin 209 entitled *How to Control Spittlebugs in Legumes*. The bulletin describes the life cycle and damage of the insect and instructions for the use of insecticides or control. Recommendations cover both aerial and ground application. Copies of the bulletin are available upon request.

•

New Fumigator Available

Sherwood Brass Company, recently announced that a new applicator that will deliver grain fumigants to bins intermittently as the bin is filled, is now on the market. The new pump, designed for installation in large storage and terminal areas, was developed jointly by the Sherwood Brass Co. and Dow Chemical Co, of Midland. The announcement stated that the new pump is designed to stand up under the chlorinated hydrocarbons normally used for fumigating, whereas normal pumps will not stand up under such useage.

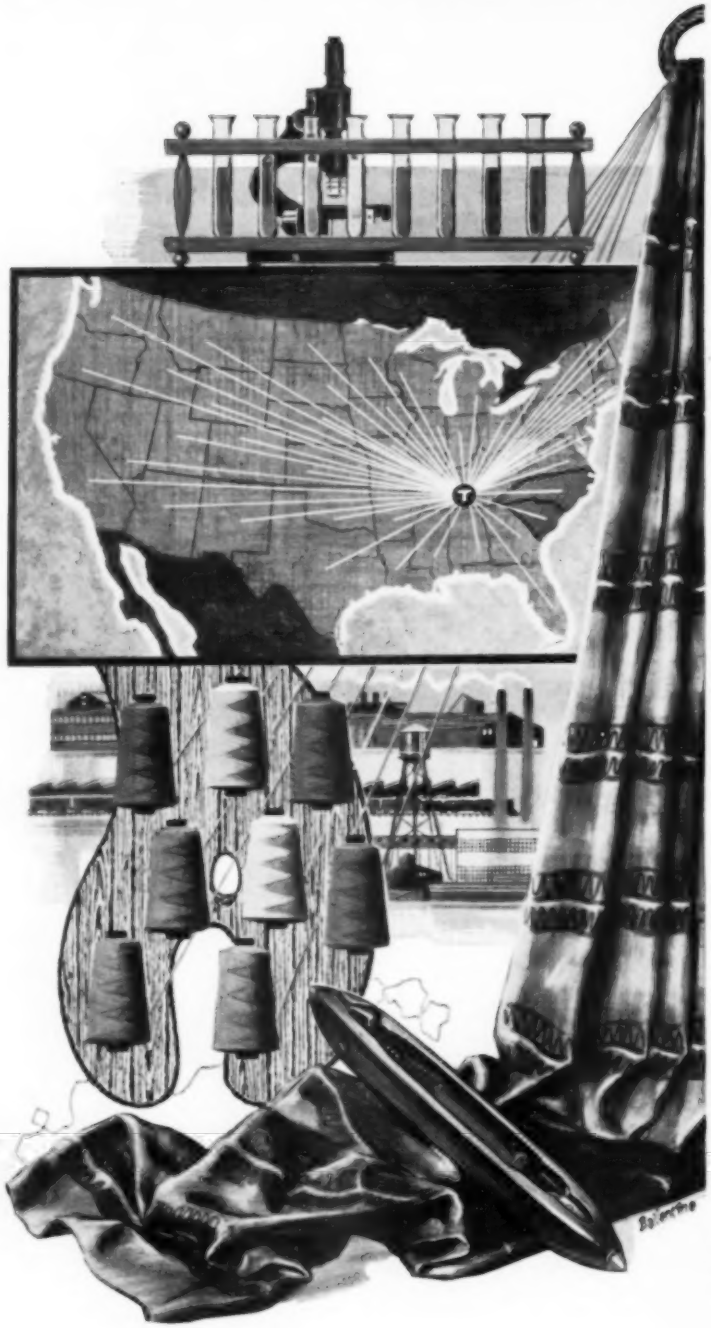
•

New Movie by Hercules

A new movie, "Cotton Insects and Their Control," has been released by Hercules Powder Company, Wilmington, Del. Designed for use in the Cotton Belt, the film contains no mention of toxaphene but emphasizes the point that cotton insect control pays off. The company has made 50 prints of the film available through its branch office repre-

(*Turn to Page 115*)

THERE'S A TOUCH OF TENNESSEE IN CAROLINA TEXTILES



The people of the Carolinas were making fine textiles even before the Constitution was signed. The fame of Carolina Textiles has grown with the Country and so has Tennessee's part in this most important industry. Today, Tennessee supplies Acetic Acid for bleaching and treating fabrics, Benzaldehyde for dye manufacture; Pig Iron and Ferro-alloys for machinery—not only to the Carolinas but to the other states producing textiles. And for cotton, the principal raw material, Tennessee supplies Sulphate of Ammonia for mixed fertilizers and Benzene Hexachloride for dust and spray formulations to protect the crops from the Boll Weevil.

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Technical Briefs

Test Toxaphene Emulsions

Stability of toxaphene emulsions, when employed for vat dipping of cattle has been investigated by B. I. Sparr, U.S.D.A. Agr. Research Administration, B.E.P.Q. In laboratory experiments several combinations were found which proved more stable than commercial formulations presently employed. It was emphasized by Mr. Sparr that his results were obtained largely in laboratory glassware, and even confirmatory stability tests made with emulsions held in miniature vats cannot be taken as the equivalent of actual field studies. However, since some of the formulations tested showed definite superiority over present commercial products, further testing in ranch vats in practical field experiments will be pursued.

In the test work, 103 emulsifiers were tried. The following were found to give satisfactory formulations with at least one type of toxaphene emulsion:

Emulsifier	*Solvents in emulsions that were satisfactory*
Gallowhur Chemical Corp.	
Skul 181-A	Kerosene
Monsanto Chemical Co.	
Emulsifier R	Kerosene
Emulsol Corp.	
Emcol H-77	Pine oil
Griffin Chemical Co.	
Trex 45	Turpentine
Trex 80	Turpentine
Tenlo 400	Kerosene and turpentine
General Dyestuff Corp.	
Antarox D-100 z	Pine oil
Arnold, Hoffman & Co.	
Aerowet Anhydrous RS	Kerosene and turpentine
Ahco RL 382	Kerosene
Van Dyk & Co.	
Emulside 75	Kerosene
Nopco Chemical Co.	
Nopco HBX-2	Kerosene
Nopco 1219-A	Kerosene
Nopco Agrimul 60	Kerosene and turpentine
E. F. Drew & Co.	
Emulsifier 803-M	Turpentine
Chlorasol	Pine oil and turpentine
E. I. du Pont de Nemours & Co.	
Duponol G	Kerosene

Of this group the kerosene-type concentrates containing Emulsifier R, Tenlo 400, or Duponol G were stable in 1-percent sodium chloride solution for a week. Four emulsifiers performed well in two types of concentrates. Many of the concentrates that did not meet these criteria may be suitable for other purposes, such as use in sprays.

•

Trace Elements in NPK

A new and economical process for trace elements use with N-P-K fertilizers is based upon the investigation of methods of fertilizer mixing, in an attempt to secure more effective performance (greater availability) of trace elements in combination with N-P-K carriers.

It was found that super-and triple-phosphates only slightly diminish the availability of trace elements; however, the alkaline components of N-P-K fertilizers (ammonia and lime) cause greater retention of trace elements by this type of fertilizer.

Results show that zinc and manganese are retained by N-P-K and superphosphates to a much smaller degree than copper. This is in agreement with the order of precipitation of these elements with ammonia. Copper is precipitated at a lower pH than either zinc or manganese.

It was found that much less sorption of trace elements occured if mixing was carried out after the N-P-K fertilizers had been ammoniated. By this order of addition the major portion of ammonia had already been assimilated by the acidity of the fertilizer before the trace element salts were added.

Chemical Reactions Which Occur Between the Trace Elements Salts and N-P-K Carriers in Fertilizers. by A.A. Nikitin and Josephine W. Rainey, director of Agricultural Research, and Assistant, respectively, Tennessee Corporation Research Laboratories, College Park, Georgia.

•

Weed Control in Britain

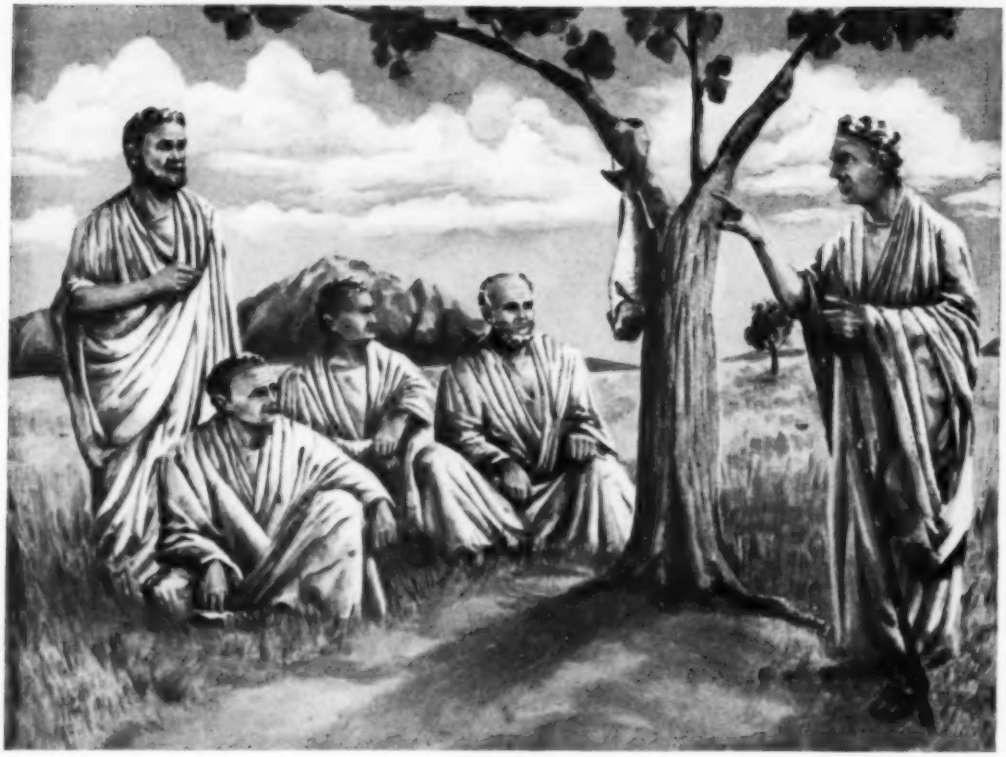
Recent progress in weed control in Great Britain is reviewed in an article "Chemical Weed Control" by Dr. W. G. Templeman in the January, 1952 issue of the *Manufacturing Chemist*, London. Comparing "Methoxone", the herbicide used most widely in Britain, with 2,4-D, Dr. Templeman says "there appears to be little to choose between the herbicidal properties of corresponding derivatives, but recent work has shown that heavy doses of esters of Methoxone are less damaging to cereal crops than 2,4-D esters. This means that it may be possible to use heavier doses and eradicate weeds in cereal crops against which 2,4-D esters have failed. Legumes and linseed are also less damaged by Methoxone."

Discussing comparative advantages and disadvantages of combination herbicides, this authority points out that in general "the translocated herbicides like the hormone weed killers are more efficient if the tissues to which they are applied remain undamaged." Thus mixing of weed killers necessarily calls for "care and consideration of the crops and weeds to which application is to be made and translocated, and contact weed killers are most often not ideal mixers." Where the herbicide is for pre-emergence use, however, Dr. Templeman reports that use of mixtures may be more successful.

The suggestion has been advanced that, as with insecticides, continuous use of one weed killer may (a) produce highly resistant strains of normally susceptible weeds, or (b) may lead to a great increase in the number of weeds of the resistant type, while successfully removing susceptible species. There is no sign yet, this authority reports, of the first possibility resulting, but to forestall the second eventuality it has been suggested that rotation of weed killers be practiced, using a hormone weed killer one year and a material like DNOC the next. This suggestion, Dr. Templeman indicates, seems to have more merit than the possible use of weed killer mixtures.

On the subject of herbicide-fertilizer mixtures, a number of disadvantages are pointed out, which at least in this writer's opinion "more than nullify the advantages".

Now *there* was a recommendation!



"Hang a fish," said Pliny the Elder ...

"near your fruit trees and the ants will collect in one spot."

Fortunately for Pliny's reputation, he left more to posterity than his agricultural recommendations. But, if he sounds like a man who would have trouble making a passing grade in Freshman Entomology, the orchardists back in 69 A.D. regarded Pliny's "inside information" as top-drawer.

They sat in rapt respect as Pliny, with an acute display of perception, observed that "ants are a great pest to trees" but that a dead fish would so outrage the little creatures' nasals as to start a stampede.

Happily, fish are no longer on the approved list of pesticides. However, during the almost 1900 years that have elapsed since Pliny's day science probed many dark and fruitless avenues before Geigy Company, Inc. revolutionized the insecticide industry by originating DDT insecticides.

Therefore, whatever your requirements remember that Geigy Company, Inc. represents the highest standards of quality, dependability and service.

Aldrin	Chlordane	Fumigants	Pentachlorophenol	TDE (DDD)
Arsenicals	Copper	Lindane	Purified DDT	Toxaphene
BHC	DDT	Methoxychlor	Rotenone	2,4-D & 2,4,5-T
Carbamates	Dieldrin	Parathion	Sulphur	Specialty products

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Aberdeen, N. C.; Burlington, Iowa; Colorado Springs, Colo.; Elkton, Md.; Fresno, Calif.; Houlton, Me.; Leland, Miss.; McGregor, Tex.; Orlando, Fla.; Walla Walla, Wash.

Soil Residues Determined

Parathion, toxaphene and methoxychlor were mixed with soil of three pH levels. Analyses made at intervals of 1, 2, 4 and 8 weeks thereafter indicate following conclusions:

Toxaphene was the most persistent of the three insecticides studied, parathion was somewhat less stable, and methoxychlor the least permanent. The three insecticides showed rapid disappearance during the first two weeks after application; this limits the possibility of heavy buildup and a permanent poisoning of the soil by repeated spraying with these toxicants. Increasing soil pH by adding lime greatly accelerated the decomposition of the insecticides, the effect being most pronounced in the case of toxaphene. Parathion was not lost from the soil by volatilization to any appreciable extent; rather, the insecticide disappeared slowly, presumably by chemical degradation.

In all cases, the insecticides were detected in the soil at the end of eight weeks; therefore, these chemicals should be used cautiously when applied at high concentration directly to the soil for the control of insects and other soil pests.

—"The Persistence of Parathion, Toxaphene and Methoxychlor in Soil", Tech. Bulletin No. T-42, Jan. 1952, Oklahoma Agricultural Experiment Station.

•

EPN vs Armyworm

The yellow striped armyworm, which in 1951 caused extensive damage to cotton plants in Southern States, was controlled effectively with "EPN" in preliminary field experiments, the U.S. Department of Agriculture has reported. USDA entomologists found several effective insecticides among the 11 that they tested against the pest in these experiments, but "EPN" proved by far the best, at both a low and a high rate of application. This new insecticide, although in use experimentally, probably will not be available on the market in 1952.

Effectiveness of the insecticides was determined by introducing a known number of the armyworms into caged sections of the sprayed cotton plants where ability of the worms to withstand the particular poison used in the spray could be observed periodically.

In all tests, "EPN" resulted in 100 percent control, but killed the armyworms faster at the higher rate of application. Applied at 0.1 pound per acre as an emulsion spray, "EPN" either killed or paralyzed 85 percent of the pests within 22 hours after spraying. The kill climbed to 95 percent in 42 hours, and was complete after 90 hours. Applied at double rate—0.2 pounds per acre—"EPN" achieved 100 percent kill within 22 hours.

Toxaphene was rated a satisfactory control, both at low and high dosages (0.33 and 0.83 pounds per acre). It killed 78% of the armyworms 90 hours after spraying. TDE and DDT, each at a rate of 0.33 pounds per acre totalled 89 and 67 percent control respectively after 90 hours. "Compound 269" sprayed on at the rate of 0.03 pounds per acre also gave 67 percent control after 90 hours.

Screw-Worm Fly Control

The use of radiant energy in an attempt at eradication — rather than mere control — of the screw-worm fly has been announced by the Agricultural Research Administration, U.S.D.A. The method involves liberation of laboratory-reared insects after exposing them to radiation that sterilizes them. A treated female fly lays infertile eggs that do not hatch. When a radiated male has mated with a normal female in the laboratory, the eggs from the female are deposited as usual, but do not hatch into the maggots that damage livestock. The studies have shown that the female fly mates only once, and if this mating is with a treated male, none of the 300 or more eggs she lays in her lifetime, hatch. Cage tests indicate that when there are 5 to 10 times as many radiated as normal males in a mating area, eggs from most females are infertile and there is only slight reproduction.

The Bureau of Entomology and Plant Quarantine is not ready to recommend a full scale campaign until they have had opportunity to make thorough field tests and to develop practical and economical applications of the scientific principles. Plans have been developed for small scale field tests on an island off the west coast of Florida. The Department says that this will constitute a "pilot plant" scale test against wild flies designed to try the method under practical conditions and to give them practical experience in the mass rearing, mass irradiation, and liberation of the treated flies.

Mass rearing laboratories would be set up ready for production of millions of the insects each week, starting early in the year. The insects would be irradiated on their sixth pupal day, and the flies when hatched would be distributed over the infested area from airplanes. Rearing and distribution would be continued through the normal season of the insects and into the following winter.

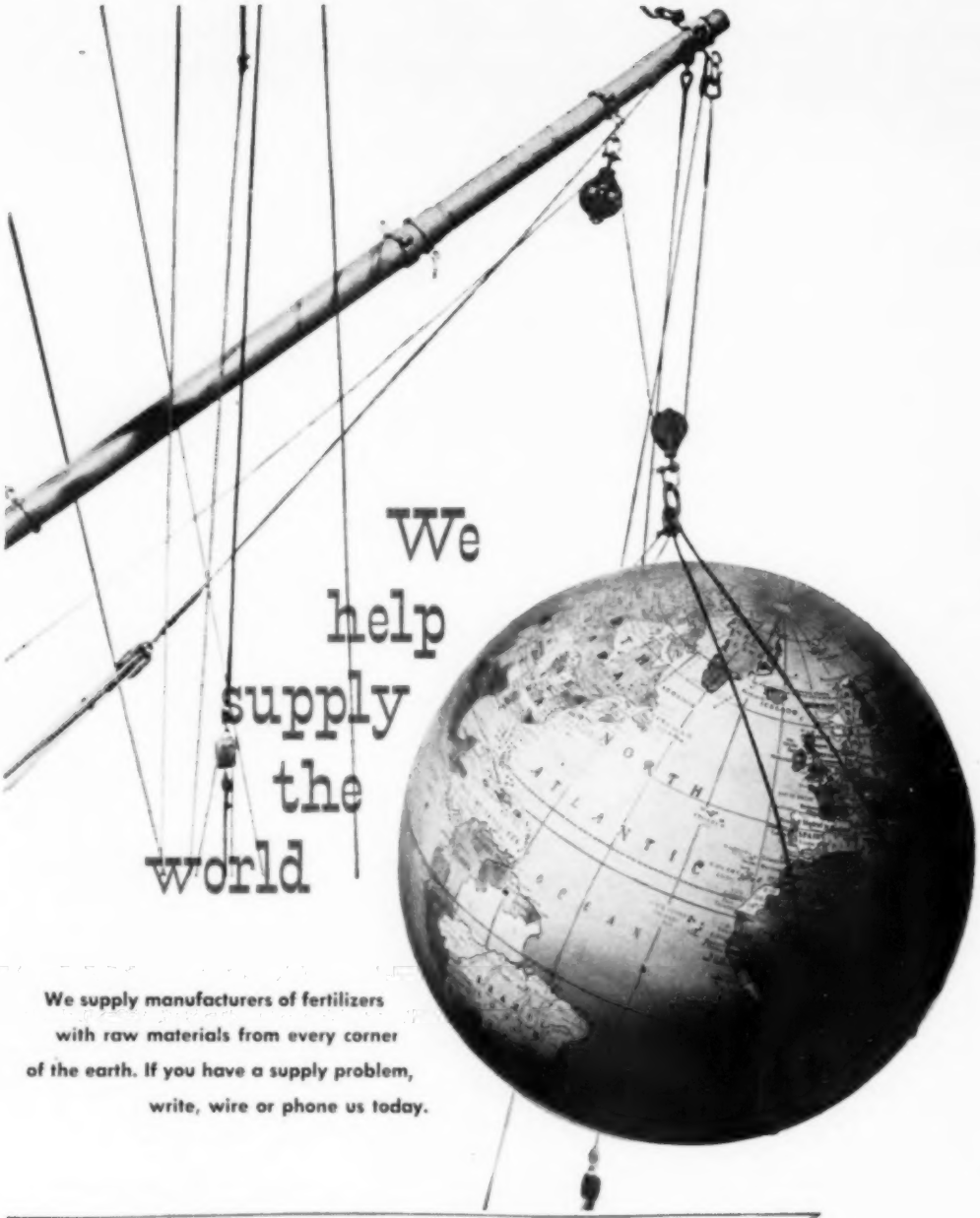
BEPQ officials emphasize that their hopes for successful eradication of screw-worm fly by this method are confined to the Southeast where the insect was not known until 1933, and is not so widely distributed. For the western area, where the screw-worm has always been a serious pest, research workers have continued to improve treatments for infested animals. "Smear 62" has been the standard remedy for several years, but the BEPQ is now recommending "EQ-335", which gets its name from its principal constituents — 3 percent of lindane and 35 percent of pine oil.

The original research on the new control method employing the radiated flies was done at the Bureau's Kerrville, Texas, laboratory.

•

Offer Chart on Herbicides

Thompson Chemicals Corp., St. Louis, 3, is offering copies of a new chart embodying latest information on chemical control of weeds and brush. Directions are given on what to spray, when to spray, what dilution to use, etc. Instructions are offered for both foliage spray and basal bark treatment.



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INDUSTRY NEWS

Named Technical Director

Frederick B. Grosselfinger has been appointed technical director by the Synthetic Nitrogen Products

F. B. GROSSELFINGER

Corporation, New York, makers of "Cal-Nitro" and importers of potash from Western Germany.

Mr. Grosselfinger is a graduate from Massachusetts Institute of Technology, where he received both his bachelor's and Master's degrees in Chemical Engineering.

In 1941 Mr. Grosselfinger joined the Signal Corps, and served five years in the Army, 3½ of which were spent in North Africa and European theater operations.

Upon separation from the Army, Col. Grosselfinger joined Hydrocarbon Research, Inc., in New York and worked on process development and sales engineering. One year was spent in work with the Atomic Energy Commission.

At Synthetic Nitrogen Products Corp., Col. Grosselfinger will work with Miguel Tegtmeyer, executive vice-president, and Dr. Werner Duehrssen.

•

Miller Heads Prentiss

J. Miller has been elected president and treasurer of the Prentiss Drug & Chemical Co., New York, succeeding the late Harold King as head of the company. He was formerly secretary and treasurer, and has been associated with the firm since 1919 when it was known as W. Benkert & Co. and later R. J. Prentiss & Co. Friar N. Thompson, Jr. has been named vice-president. Mr. Thompson who was formerly with Hercules Powder Co., Wilmington, joined Prentiss six years ago. A. W. Bevernick continues as vice-president and mid-west manager, and Charles Hermann as vice-president. H. Franklin Seeland has been named secretary and Malcolm Miller assistant secretary.

Coincident with the announcement of the new officers of the company, Mr. Miller announced that Dr. Clarence S. Harris formerly with the Shell Oil Co., New York, has become associated with Prentiss as a technical sales representative. He also stated that the new Board of Directors will be comprised of Messrs. Hermann, Thompson and Miller.

•

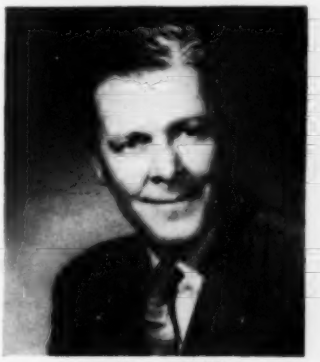
Aerosol Labels Changed

That labels on aerosol bombs need no longer bear the U. S. Patent number nor the license under which the maker operates, has been announced by Dr. H. L. Haller, Assistant Chief, Bureau of Entomology and Plant Quarantine, U.S.D.A.

"A reexamination has been made of all the factors involved in the question of labeling aerosol bombs and it has been decided that it is in the public interest to discontinue the specification in the license that all such containers shall bear a label referring to the patent and the license issued thereunder. Accordingly, Section 6 of all existing licenses is cancelled and reference to the patent should be omitted from all labels hereafter printed on or for use on such containers. Relabeling of goods already on the market or ready for market will not be required," the announcement stated.

Fisher to Calspray Post

The appointment of Dr. R. A. Fisher as research coordinator for California Spray-Chemical Corporat-



DR. R. A. FISHER

ion has been announced. He was formerly the company's branch manager in Portland, Oregon.

Mr. Fisher received an MS degree in entomology at the University of Idaho, and in 1937 completed his Ph. D in entomology at Iowa State College. He then worked with the United States Department of Agriculture's Bureau of Entomology and Plant Quarantine for 1¼ years, and later at the University of Idaho as an entomology instructor.

He joined the California Spray-Chemical Corp. in 1946 as one of their technical fieldmen in Washington State to advise farmers and ranchers in pest control. In January of 1948 he was made Branch Manager at Portland, Oregon, a position he held until his latest appointment.

•

Nebraska Nitrogen Plant

Plans of the Consumers Cooperative Association, Kansas City, Mo., to build a new nitrogen plant at Aurora, Nebraska, were endorsed by members of the Aurora Co-op Elevator Co. at their recent annual meeting.

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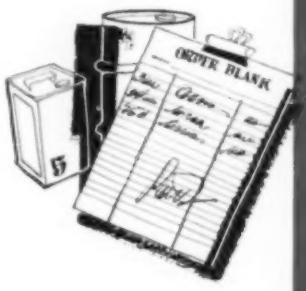

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For easy-to-follow safety methods and information on formulating and applying, write for Technical Bulletin O-52, "*Niran.*" We suggest that you contact the nearest Monsanto Sales Office soon about your Niran requirements for 1952. MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri.

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Program Plans Develop for NAC Meeting

A TENTATIVE program for the 1952 spring meeting of the National Agricultural Chemicals Association, to be held in the Fairmont Hotel, San Francisco, Calif., has been released by the Association in Washington. The first day, Sunday, April 6, will be devoted to committee meetings and a reception from 5 to 7 p.m.

The general session, Monday morning, will be opened by Paul Mayfield, Hercules Powder Co., Wilmington, NACA vice-president. Following on the program will be Arthur W. Mohr, California Spray Chemical Corp., Richmond, president of the NAC Association; W. E. Ball, president of the Western Agricultural Chemicals Association; Joseph B. Cary, Food Machinery Corp.; W. R. Allstetter, deputy director, Office of Materials & Facilities, PMA, USDA, Washington, D.C.; and Dr. G. F. McLeod, Sunland Industries, Fresno, Calif.

Lea S. Hitchner, NAC Association secretary, will preside at Tuesday morning's session which is restricted to members of the NACA and the Western A.C.A. Appearing on this program will be John Conner, Washington, D.C., counsel; Joseph A. Noone, NAC Association, Washington; and Dr. L. Gordon Utter, Phelps Dodge Refining Corp., New York.

The annual NAC banquet will be held Tuesday, with Walter E. Ball as chairman. The advance program notes that there will be "no toastmaster—no speeches—dress optional." Entertainment will be provided.

President Mohr will preside at Wednesday morning's session. On the program will be Dean Stanley Freeborn, University of California, Berkeley; W. C. Jacobson, assistant director, Department of Agriculture, State of California; and Dr. A. M. Boyce, Citrus Experiment Station, Riverside.

A golf tournament will be held at the Olympic Club at Lakeside, with Ed. Schuler as chairman; and steamer tours of San Francisco Bay have been arranged through the W.A.C.A. which has also provided for refreshments and transportation to and from the dock.

An attractive program is being arranged for the ladies, under the chairmanship of Mrs. Edward H. Littooy.

The arrangements committee is as follows: L. T. Kett, chairman, Mountain Copper Company, Ltd., San Francisco; W. E. Ball, Stauffer Chemical Company, San Francisco; E. C. Cody, California Spray-Chemical Corp., Richmond; Elmer J. Davis, Los Angeles Chemical Company, Los Angeles; E. T. Doyle, Tobacco By-Products and Chemical Corp., San Francisco; A. J. Flebut, Niagara Chemical Division, Food Machinery and Chemical Corp., Richmond; W. J. F. Francis, Pennsylvania Salt Mfg. Co. of Washington, Tacoma; W. D. Gray, secretary, Western Agricultural Chemicals Association, San Francisco; David T. Prendergast, The Dow Chemical Co., San Francisco; and Edward Schuler, Monsanto Chemical Co., San Francisco.

MEETINGS

South Dakota Weed Conference. Huron, S. D., March 20 & 21

N. Central States Branch, AAEE. St. Paul Hotel, St. Paul, Minn., March 27 & 28.

American Chemical Society, Pesticides Subdivision. Milwaukee, Wis., March 30-April 3.

National Agricultural Chemicals Association, Spring Meeting, San Francisco, Calif., Fairmont Hotel, April 6-9.

Fertilizer Safety Meeting of North Carolina State Safety Conference, Asehville, N. C., May 6.

Fertilizer Safety Section of the Virginia State Safety Conference, Richmond, Va., May 16.

Conference on Use of Isotopes in Plant and Animal Research, Kansas Agricultural Experiment Station, Manhattan, June 12-14.

National Fertilizer Association, Greenbrier Hotel, White Sulphur Springs, W. Va., June 16-18.

Meeting of Advisory Committee of Fertilizer Section of National Safety Council, Greenbrier Hotel, White Sulphur Springs, W. Va., June 18.

American Plant Food Council, Homestead Hotel, Hot Springs, Va., June 19-22.

Pacific Branch, A.A.E.E., Mar Monte Hotel, Santa Barbara, California, June 24-26.

Soil Improvement Committee, Pacific Northwest Plant Food Association, Pocatello, Idaho, July 9, 10 & 11.

Sixth International Grasslands Congress, Penn State College, State College, Pa., August 17-23.

American Phytopathological Society, Cornell University, Ithaca, N. Y., September 9-12.

Meeting of Fertilizer Section of National Safety Congress, Chicago, Ill., October 22 & 23.

Sixth Annual Beltwide Cotton Mechanization Conference, Bakersfield, California, Oct. 22-24.

California Fertilizer Association, Desert Inn, Palm Springs, Calif., Nov. 10-12.

Joint meeting, North Central Weed Control Conference and Western Canadian Weed Conference, Royal Alexandra Hotel, Winnipeg, Canada, December 8, 1952.

•

Cyanamid Names White

Appointment of Russel M. White as western sales manager of American Cyanamid Company's Agricultural Chemicals Division was announced February 19. He will make his headquarters at the firm's west coast offices at 111 Sutter Street, San Francisco. A native of California, Mr. White has been with Cyanamid since 1937.

•

C.S.C. Advances G. Lines

George O. Lines of Peoria, Ill., has been named general manager of Commercial Solvents Corp.'s newly created Animal Nutrition Division, according to a recent announcement by H. J. Henry, vice-president of the Product Division. Mr. Lines will operate from the company's general offices in New York City. He has been manager of Commercial Solvents' Peoria plant since 1946.

•

Weber Named V-P

The Frank G. Hough Co., Libertyville, Ill., has announced the appointment of Milton J. Weber as vice-president, procurement.

Mr. Weber is a graduate of DePauw University, Greencastle, Ind., and has been associated with the Santa Fe Railroad, the John Deere Distributor Organization and the J. D. Adams Co. He came to the Frank G. Hough Co. from the latter concern where he held the position of office manager of the St. Louis branch.

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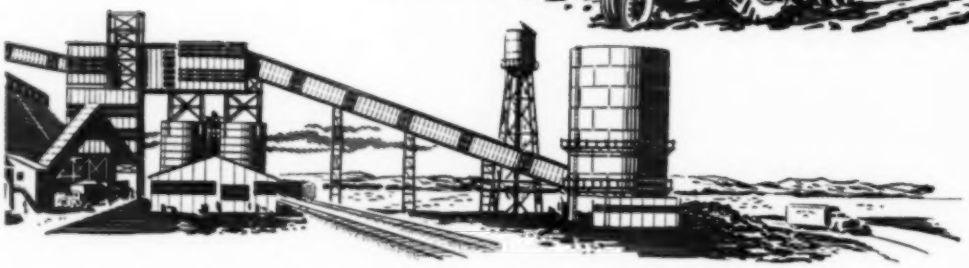

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So. Safety Conference On

The 13th annual Southern Safety Conference and Exposition was scheduled to be held March 2-4 at the Biltmore Hotel, Atlanta, Ga.

The Fertilizer Section was to hold its meeting Monday afternoon, March 3, under the chairmanship of Vernon S Gornto, Smith-Douglass Co., Inc., Norfolk, Va., secretary of the Fertilizer Sub-Section of the National Safety Council.

W. N. Watmough, Jr., vice-president, Mixed Fertilizer Div., Davison Chemical Corp., Baltimore, was to talk on "Top Management's Safety Responsibility and the Benefits the Fertilizer Industry Will Derive from Safe Operations"; R. E. Reitz, safety engineer, Glens Falls Indemnity Co., Richmond, Va., was to speak on "How to Organize an Accident Prevention Program in a Fertilizer Plant"; and a symposium under the leadership of J. M. Sisson, safety officer, TVA, Wilson Dam, Ala., was to discuss "Achieving Safety in Fertilizer Plants."

Other speakers named on the advance program included H. R. Krueger, director, Technical Service, Phillips Chemical Co., Bartlesville, Okla., "Handling Anhydrous Ammonia and Ammonia Solutions"; U. C. Ellis, general superintendent, Plant Food Div., Swift & Co., Chicago, "Handling Bulk Storage"; and C. E. Killebrew, sales manager, The Frank G. Hough Co., Libertyville, Ill., "Safe Operation of Mobile Equipment."

Showing of the film, "Henry's Ghost," a sound picture on fertilizer safety, was also scheduled. Herbert D. Leigh, Jr., safety engineer, Liberty Mutual Insurance Co., Atlanta, Ga., was to present the picture.

•

Welch Joins Am. Chem. Pt.

American Chemical Paint Co., Ambler, Pa., has announced that Jim Welch has joined the sales staff of the company's Agricultural Chemicals Division. Mr. Welch, who will represent A.C.P.C. in the southwestern U. S., did graduate work in agronomy at the U. of Nebraska and holds a B.S. degree in agronomy from the Oklahoma A & M. He has also had experience as a county agent.

•

Gardner Joins Pennsalt

William B. Gardner has joined Pennsalt of Washington as sales-

WM. B. GARDNER

service representative in the Agricultural Chemicals Division. He will serve the territory composed of California, Arizona and New Mexico and will make his headquarters at the company's Southern California sales office in Los Angeles.

Mr. Gardner was formerly associated with the University of California Agricultural Extension Service, Riverside, where he worked with the Farm Advisors' Office on various field projects involving control of insect pests.

A native Iowan, he was graduated from Iowa State College, where he majored in agronomy. He is a member of the American Association of Economic Entomologists. He and his family live in suburban Los Angeles.

Joint Weed Meet in Dec.

A joint meeting between the North Central Weed Control Conference and the Canadian Weed Control Conference is being planned for December 9-11, 1952, at the Royal Alexandra Hotel, Winnipeg, Man., Canada. According to H. E. Wood, chairman of the Manitoba Weeds Commission, Winnipeg, tentative arrangements have been made to hold an exhibit in conjunction with the conference. Program plans have not been announced, but are expected to be outlined shortly according to Mr. Wood.

It has also been announced by the North Central Weed Control Conference that copies of the proceedings of the 8th annual meeting held in Oklahoma City, Okla. in December are available at $2. Write to Larry Robinson, Chairman, 122 State Capitol Bldg., Oklahoma City 5, Okla.

•

Cyanamid Names Gleissner

Dr. Bruce D. Gleissner has been named acting manager of the Insecticides Department by American Cyanamid Co., New York. He was formerly assistant manager. He replaces the late Harry Langhorst who died in January. Dr. Gleissner came to Cyanamid from Pennsylvania State College where he was assistant professor of entomology. He has been closely associated with American Cyanamid's principal insecticidal product "Thiophos" parathion from the period of the original research on through development and use in agriculture.

Alabama Pesticide Short Course Under Way

FEBRUARY 26 and 27 were the dates set for the third annual short course for custom applicators and pesticide manufacturers and distributors, Alabama Polytechnic Institute, Auburn, Ala.

According to the advance program, the following program was to be carried out:

Gus Ashcraft, Ashcraft-Wilkinson Co., Atlanta, was to preside at the opening session which included addresses of welcome by Drs. Ralph B. Draughon, president, and E. V. Smith, director of the Agricultural Experiment Station, Auburn. Papers scheduled for delivery the first morning included, "Insects and Other Factors Affecting Pecan Production," by T. B. Hagler, associate horticulturist; "The Status of Spraying and Dusting Pecans for Control of In-

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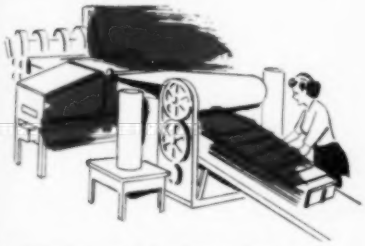

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Arkansas Issues Formal Herbicide Recommendations

FORMAL recommendations for chemical weed control in cotton growing are being issued by the Arkansas Agricultural Extension Service for the first time, following a survey which revealed that 80,325 acres of Arkansas cotton will be treated with pre-emergence spray and 114,000 acres with post-emergence spray during the coming season. Because these methods are new, and must be approached with full knowledge of the subject, the Extension Service planned to conduct a series of meetings for farmers in all cotton-growing counties during January and February to explain the systems in full detail.

R. H. Sloan, Extension cotton specialist, and R. E. Howell, Extension agricultural engineer, were among the scheduled speakers, with their principal advice to be: "Don't jump into this on a full scale until you have had one or two years of experience on small acreage."

All speakers stressed the place of chemical weed control in reducing labor costs in the fast-developing cotton mechanization program. Until now the Extension Service, though working regularly with farmers using the new methods, has been cautious in making official recommendations. On the basis of this experience, however, the Extension Service will report that average cost of either pre-emergence treatment is not more than $8.75 per acre. In comparison farmers paid as much as $40 per acre last year for hand-chopping of cotton. The 1951 season, it is noted, was exceptionally wet, and chopping costs ran high because of rank weed growth and shortages of farm labor.

Specific brands of weed control preparations are still being tested by Agricultural Experiment Stations in Arkansas. Already under test are the fortified type of post-emergence herbicide known as "No-Ho," and two oils of the non-fortified type—"Esso" and "Lion" products. The only pre-emergence material on the market in quantity—Dow Chemical Company's "Premerge"—has been recommended by the National Cotton Council in its first pronouncement on the subject, and a guide for chemical weed control by its use has been published by the organization.

Extension agencies are still experimenting with the various types of pre-emergence and post-emergence preparations now available on the market, and probably will not recommend a specific brand until another year or two of tests have been completed.

•

Pennsalt Expands to S.A.

Pennsalt International Corp., Philadelphia, announced recently the formation of Pennsalt de Mexico, S.A., a new company with a plant in Mexico City for manufacturing, packaging, and marketing of finished insecticide dusts. Two other similar companies are also in operation: Pennsalt-Comani, S.A., in Maracay, Venezuela, and Pennsalt Industrias Quimicas do Brasil, S.A., in Sao Paulo, Brazil. The principal operations of these newly formed companies are the manufacturing, packaging and marketing of finished insecticides for agricultural use. As far as possible, local raw materials are used in making the various insecticides, with Pennsalt International furnishing ingredients that cannot be obtained locally. Local people are employed in the plants.

Basic insecticides used in the formulations manufactured include calcium arsenate, DDT, benzene hexachloride, toxaphene, parathion, sulfur and others.

•

Ohio Fertil. Plant Opens

Opening of a new, modern factory building in Marion, Ohio has been announced by the "Na-Churs" Plant Food Company, manufacturers of liquid fertilizer.

The new structure is of steel and masonry construction, and covers 35,000 square feet of ground. Ben Peterson, head and founder of the organization, declares that the widespread acceptance of liquid fertilizer practices made it imperative to increase the productive capacity in the plant.

In addition to offices, manufacturing and storage, the new building contains facilities for chemical analysis and research. Dr. Victor A. Tiedjens, formerly of the New Jersey State Experiment Station and more recently director of Virginia Truck Experiment Station, has joined the "Na-Churs" company and will head the research department. Full time work is planned in the laboratory and in field tests to find and develop better methods of fertilizing farm crops.

Newly-installed production machinery has allowed the company to increase its liquid fertilizer from a 5-10-5 to a 7-14-7 formula at no additional cost to the consumer.

•

Rotenone Prices Up

In the wake of steadily advancing prices for cube root in South America, several American processors have announced higher prices for powdered root in the U. S. Quotations for powder in New York have been moved up almost three cents per pound and now stand at 25½¢ lb. for truck or carloads, ranging up to 28½¢ for ton lots and less. Former prices ranged from 22¾¢ to 25¢ lb. as to quantity. These prices are basis of 5% rotenone as usual.

Over the past two months, cube root prices in Peru have crept up steadily from 12¢ to 14½¢ lb., the latter being current as of March 1. Labor costs in Peru and reduced collections are given as the reasons for higher prices in the growing areas. Any sizable demand, according to reports from South America, will be inclined to send the shipping price for root above the 14½¢ level.

•

Cuba Cuts Fertilizer Duty

The government of Cuba has recently issued a decree allowing duty and tax exemptions on imports of fertilizer and other essentials for cotton cultivation.

...Yet you kill them with our BHC !

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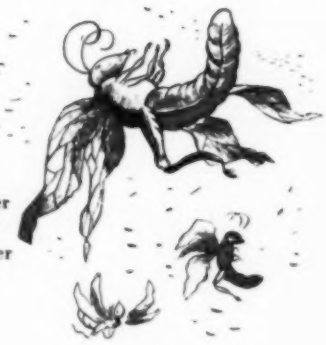

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AS WE GO TO PRESS . . .

To Discuss Pesticides, at A. C. S. Meeting

PAPERS on pesticides and residues are scheduled to be presented at the 121st National Meeting of the American Chemical Society in Milwaukee, March 30 to April 3.

Dr. H. L. Haller, assistant chief, Bureau of Entomology and Plant Quarantine, U.S.D.A., is chairman of the pesticides subdivision scheduled for Tuesday afternoon, April 1. "Synergism of the Halogenated Hydrocarbon Insecticides" is to be discussed by W. T. Sumerford; "The Physical Fate of Parathion Applied to Oranges," by R. D. Garmus; and "Estimation of Pyrethrins on Coated Paper Bags," by Fred I. Edwards and Cipriano Cueto. Other papers will discuss methods of determining the presence of various toxicants.

On Wednesday morning, April 2, Avery S. Hoyt, chief, Bureau of Entomology and Plant Quarantine, U.S.D.A., will preside at a symposium on the significance of pesticide residues. Mr. Hoyt will present the residue problem in general, followed by Dr. F. C. Bishopp, assistant chief, B.E.P.Q., "Pesticides in Agriculture."

Dr. A. J. Lehman will discuss the residue problem from a pharmacological viewpoint; Dr. Bernard E. Conley, American Medical Assn., Chicago, will talk on the general medical aspects of the residue problem; and Dr. James R. Wilson, on the nutritional significance of the problem.

"The Role of the Food Protection Committee in Relation to the Problem of Chemical Additives in Foods" will be the subject of a paper by Dr. Herbert E. Longenecker, Dean of the Graduate School, University of Pittsburgh, and chairman of the Food Protection Committee of the National Research Council. Joseph A. Noone, technical adviser, National Agricultural Chemicals Association, Washington, D. C., will speak on "Pesticide Residues and Legislative Safeguards."

The second part of the symposium, pointing out the necessity for residues, will be under the leadership of Dr. Charles E. Palm, head, Department of Entomology, Cornell University, Ithaca, N. Y. Dr. Palm will make the introductory remarks, followed by Dr. George L. McNew, managing director, Boyce Thompson Institute for Plant Research, Yonkers, N. Y., "Fungicides on Fruit Crops"; Dr. B. A. Porter, "Insecticides on Fruit Crops"; Dr. James G. Hornfall, director, Connecticut Agricultural Experiment Station, New Haven, Conn., "Fungicides on Vegetable Crops"; Dr. T. C. Allen, "Insecticides on Vegetable Crops"; Dr. F. W. Poos, "Insecticides on Field Crops"; and Dr. E. F. Knipling, assistant chief, B.E.P.Q., U.S.D.A., "Insecticides on Livestock."

The 121st ACS National Meeting is being held in Buffalo, N. Y., March 23-27 and in Milwaukee March 30-April 3.

•

Geigy 338, New Acaricide

A new acaricide, Geigy 338, announced by Geigy Co., Inc., Bayonne, N. J., is said to be active against red spiders and mites, and is not particularly toxic to insects. The product is a 4,4' dichloro benzilic acid ethyl ester, has a boiling point of 141-142° C at .06 mm Hg., and is soluble to an extent of more than 40 per cent in benzene, acetone, methyl alcohol and deodorized kerosene. The following dosages of a 25 per cent emulsifiable solution are suggested:

1 to 2 pints per 100 gallons against European red mite.
½ to 1½ pints per 100 gallons against two-spotted mites.
½ to 1½ pints per 100 gallons clover mites.

Shade Tree Conf. Elects

Vance Shield, Clayton, Mo., head of the Shield Shade Tree Specialists, was named president of the Midwest Chapter, National Shade Tree Conference at its recent meeting in Chicago. (Meeting report on page 37, this issue)

•

Soil Impr. Committee Meets

Some 325 persons were on hand at the meeting of the Midwest Soil Improvement Committee at the Palmer House, Chicago, February 22. Agronomists and soil scientists from the 13 midwestern states comprising the group were in attendance.

"The Fertilizer Supply Situation was reported by John R. Taylor, Jr., American Plant Food Council Agronomist, who declared that "The performance of the fertilizer industry in the past and especially in the last decade, demonstrates an alert and progressive industry — an industry which will supply the fertilizers needed by American agriculture." He submitted statistics showing the increasing consumption of plant food in the U. S. and reviewed recent estimates of the U. S. Department of Agriculture on fertilizer supplies to be available during the year.

Dr. William A. Albrecht, University of Missouri, told the group that agriculturists in his state are showing a "phenomenal" interest in the use of fertilizers. He stated that the rapid expansion of soil-building efforts in Missouri is due to the thinking and acting of the farmers there. They now have laboratories for testing soil and plant tissues in 74 of the state's 144 countries, he reported.

Dr. Albrecht stated further, that fertilizer materials are being purchased in Missouri regardless of the season. In the first six months of 1950, he stated, farmers purchased 54% of the total fertilizer used in the state, while the second six months represented 44%. They are aiming to treat the soil and not to stimulate the crop by application only at planting time."

Another University of Missouri speaker, Prof. G. E. Smith, in reporting on fertilizer experiments in Missouri, told how corn crops of 100 bu. per acre had been obtained in the past two years on soils so depleted that farmers had been told ten years ago that the land should be used only for small grains and grasses.

A third speaker from Missouri, Dr. Arnold W. Klemme, said that starter fertilizers used alone at planting time on Missouri silt loam soils, stimulate early growth, but fail to meet the sustaining fertility needs of the plant during later growth, when the need is greatest.

That the nitrogen content of Nebraska soils is declining, was asserted by Prof. H. F. Rhoades, University of Nebraska, Lincoln. Legumes, crop residues and manures alone cannot provide the needed replenishments, he contended, so there will be an increasing need for commercial nitrogen fertilizers.

Dr. George Stanford, Iowa State College, Ames, discussed "Time and Method of Fertilizer Application" and reviewed experiments on fall and spring applications conducted at Ames. "Thus, far, no results of appreciable significance have been obtained," he concluded.

Wisconsin farm pastures are producing only a half to a third the amount of feed they might produce if well fertilized, according to Dr. C. J. Chapman, Univ. of Wisconsin, Madison. He told of a series of pasture renovation projects from which cooperating farmers increased their milk and meat profits by use of a 10-10-10 fertilizer on the grasslands. He declared that there are thousands of acres of pasture land in Wisconsin where application of a 10-10-10 fertilizer every third year, alternating with ammonium nitrate or other nitrogen fertilizer in intervening years, would be a "highly profitable investment."

Other reports presented at the Soil Conference dealt with recent fertilizer studies in South Dakota, Kansas, Michigan, Indiana, Ohio and Illinois. Speakers included Leo F. Puhr, S. D. State College, Brookings; F. W. Smith, Kansas State College, Manhattan; R. L. Cook, L. M. Turk and J. F. Davis, Michigan State College, E. Lansing; S. A. Barker, Purdue University, Lafayette, Ind.; K. F. Nielsen, P. F. Pratt and W. P. Martin, Ohio Experiment Station, Wooster; and P. E. Johnson, University of Illinois, Urbana.

K. C. Berger, University of Wisconsin, demonstrated the use of 3-dimension color pictures as a new tool for diagnosing plant nutrient deficiency symptoms.

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by

by Stanley F. Bailey
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Leslie M. Smith
Associate Professor of Entomology, U. of California

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A PRACTICAL handbook of agricultural pest control, designed for use by the custom sprayer, the pest control operator, farm advisor, agricultural chemical salesman, county agent and field worker. This handbook covers the agricultural chemicals (insecticides, fungicides, herbicides, plant hormones, nutrient sprays, defoliants, etc.), their rates of application, useful formulas, as well as chapters on fumigation, spray machines, toxicology, dusts and dusting, aircraft, and mosquito control. Use the coupon below for your copy now!

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sects and Diseases," by John R. Cole, U. S. Pecan Field Station, Albany, Ga.; and "Availability of Agricultural Chemicals in 1952," by George R. Williamson, Agricultural Sulfur and Chemical Co., Dothan, Ala.

Asa Rountree, director of the state department of aeronautics, was to preside at the afternoon session. The following papers were listed on the advance program for delivery:

"Summary of Information on Spray Residue Hearings," by Dr. George C. Decker, Illinois Natural History Survey, Urbana, Ill.; "Chemical Control of Weeds in Corn, Peanuts and Cotton in Alabama," by V. S. Searcy, assistant agronomist; "Preemergence Chemical Weed Control on Cotton," by Hoyt Nation, Dow Chemical Co.; and "New Developments in Aerial Application of Pesticides" by John Paul Jones, aircraft flight test engineer, Civil Aeronautics Administration, Ft. Worth, Texas.

The second morning's program was to be headed by Robert G. Pitts, director of the Auburn School of Aviation. Earl D. Anderson, secretary of the National Sprayer and Duster Association, Chicago, was to present a resume of recent developments in ground sprayers and dusters; followed by a panel discussion on the evaluation of insecticides and fungicides for farm use, with W. A. Ruffin, extension entomologist, as moderator. Taking part in the program, and their subjects, were to be F. S. Arant, cotton; W. G. Eden, corn and tomatoes; R. L. Self, potatoes and peaches; R. S. Davidson, peanuts; G. H. Blake, Jr., livestock; and F. E. Guyton, household.

A two-man discussion on the "Calibration, Care and Use of Ground Sprayers" was to be carried on by T. E. Corley, assistant agricultural engineer, and C. M. Stokes, associate agricultural engineer.

Following lunch, Homer Kindig, Graceville, Fla., was to preside at the final meeting. Fred Falls, United Dusting Corp. and Messrs. Eden, Stokes and Ruffin were to discuss "Some Practical Aspects of Insect Control," and T. E. Corley was scheduled to present a paper on "New Developments in Defoliation."

Above: Flag Sulphur & Chemical Company's new office building at Tampa, Fla. Plant facilities are in the background. C. M. Nabors has been named general manager of the plant, the company has announced.

EDITORIAL

(*Continued from Page 33*)

its own investigation, and perhaps come up with widely different findings. It's no wonder our European visitors are in continual amazement as to how we keep things straight.

Just to add further to the confusion, we might remind that there was still another investigation of the whole subject of toxic residues on food,—by the Food and Drug Administration—which antedated the Delaney Committee's investigation, by many months. At the time, it occurred to us that the Delaney Committee could very sensibly wait for the recommendations which the FDA might come up with as a result of their encyclopedic study of the subject, before digging into the same pot on their own hook. They would have had a long wait, we must now admit! For the FDA's report on its study of the subject is yet to appear, its set of permissible residue tolerances still awaited. When they will make their appearance is still anyone's guess.

Yet manufacturers of agricultural insecticides, fungicides and herbicides still face the difficult decisions of how to prepare to meet the important chemical needs of the American farmer,—for next season and for the years ahead,—the decisions which will determine whether or not they can produce the chemicals which the Senate Sub-Committee recognizes are so essential to American agricultural production.

INSECT SITUATION

(*Continued from Page 73*)

In some counties, pink bollworms were found in every field inspected.

Infestations were lighter than in 1950, in west Texas, the plains area of Texas, and New Mexico. Only two of the regulated counties of southwestern Oklahoma were infested as compared to 8 in 1950. Graham County, Arizona, was infested this year, this being the first find in that State since 1948. The heavier infested area of southwestern Louisiana in 1950 was in a non-cotton zone during 1951. However, Vermillion Parish was found infested again this year.

Seventeen Texas counties outside the quarantined area were found infested during 1951. For the majority of the counties this was the first time that infestation had been found. However, Robertson County, one of the group, was the seat of the first pink bollworm infestation in the United States in 1917. With the exception of Hunt and Wood the counties either adjoin the quarantined area or are connected by counties found infested. Pink bollworms were also found in two counties in Oklahoma outside, but immediately adjacent to the quarantined area.

Inspections for pink bollworm in California, Arkansas, Mississippi, Alabama, Georgia, and cultivated cotton in Florida were negative.★★

"Black Leaf" RELIABLE, DEPENDABLE PEST CONTROL PRODUCTS

The famous Black Leaf® trademark is the tried and trusted friend of millions of Americans. For more than 40 years it has been the symbol of quality and dependability to farmers, stockmen, fruit and vegetable growers, florists and home gardeners. Here are some old and some new members of the big family of Black Leaf pest control products:

Aldrin: Black Leaf Aldrin Dusts are available in various formulations: 2½% Aldrin, 2½-5-0 (with 5% DDT), 2½-10-0 (with 10% DDT), 2½-5-40 (with 5% DDT and 40% Sulphur), and 2½-10-40 (with 10% DDT and 40% Sulphur). These dusts control boll weevils, bollworms, leaf worms, thrips and similar insects infesting cotton. Black Leaf Aldrin Emulsifiable Concentrate is produced containing 2 pounds of Aldrin per gallon for spraying cotton to control boll weevils, thrips and grasshoppers.

Arsenate of Lead: Black Leaf Arsenate of Lead is a standard, high-quality Lead Arsenate for control of chewing insects in accordance with state recommendations.

Benzene Hexachloride: Black Leaf 3-5-40, containing 3% gamma isomer of Benzene Hexachloride, 5% DDT and 40% Sulphur is widely used on cotton for control of boll weevils, bollworms, thrips, aphids and similar insects. Also available without Sulphur (3-5-0), and with 10% DDT (3-10-40 or 3-10-0).

Calcium Arsenate: Black Leaf Calcium Arsenate is a standard product, especially suited for dusting cotton to control boll weevils and certain other insects, and for use wherever Calcium Arsenate is recommended for dusting or spraying.

Chlordane: Black Leaf 72% Chlordane Emulsifiable Concentrate is a high-quality product for control of ants, roaches, flies, or similar insects . . . and also for control of soil-infesting insects, such as wireworms, Japanese beetle larvae, etc. Other formulations of Chlordane, such as 45% emulsion, 40% dust base and 40% wettable powder, are available.

DDT: Black Leaf 50% DDT Wettable Powder is recommended for control of insects on fruits, vegetables, field crops, etc. Black Leaf 25% DDT Emulsifiable Concentrate is formulated to meet exacting requirements for control of bollworms on cotton, and is generally suitable for spraying crops for which DDT emulsifiable concentrates are recommended. Black Leaf 10% DDT and 5% DDT Dusts are widely used for the control of insects infesting vegetable and field crops and for the control of cotton bollworms. Formulated on a special tobacco material carrier, Black Leaf 10% DDT Dust makes an excellent product for use on tobacco.

DDT/Parathion: Black Leaf 253 is a combination of 25% of DDT and 3% of Parathion, formulated on a special tobacco material carrier. This highly-effective product controls codling moth, leafhoppers, red-banded leafroller, certain scale insects and mites infesting apples, grapes and similar fruits. This combination offers a high degree of efficiency and economy when used in the second cover spray and subsequent applications as recommended by local authorities.

Dieldrin: Black Leaf Dieldrin Emulsifiable Concentrates are formulated especially for use on cotton, to control boll weevils, thrips and similar insects, and provide long-lasting effectiveness.

Nicotine Products (Nicotine Sulphate, Nicotine Alkaloid, and Fixed Nicotine): The famous Black Leaf 40 and Black Leaf 99 are the recommended forms of Nicotine for use in controlling aphids and similar soft-bodied sucking insects infesting fruits, vegetables and field crops, by spraying or dusting – and Black Leaf 155 (Fixed Nicotine) is the recommended form of Nicotine for spraying fruits to control codling moth and similar insects, its use being particularly desirable during the latter part of the season to avoid undesirable residues at harvest. Made by the world's largest manufacturers of Nicotine insecticides.

Parathion: Black Leaf 15% Parathion Wettable Powder (Dustless) is formulated on a special tobacco material carrier to eliminate the hazardous dustiness of this important new insecticide. The Dustless feature is an extra safeguard.

Sulphur Dusts: Black Leaf Dusts, combining Sulphur, Copper and DDT, are recommended for control of leafspot, leafhoppers and certain other insects and diseases attacking peanuts.

TEPP: Black Leaf Vapo-Fume® 40, containing 40% of tetraethyl pyrophosphate, has special utility in the control of mites and certain other insects. Conveniently packed in 1-gallon containers – and in larger containers for remanufacturing purposes. This product is quick-acting and highly effective, leaving no undesirable residues. Precautions should be observed in handling, as with all phosphatic insecticide materials.

Toxaphene: Black Leaf Toxaphene Emulsifiable Concentrates – widely used to control bollworms, boll weevils and similar insects infesting cotton – are formulated to contain 4, 6, or 8 pounds of Toxaphene per gallon. Also used for controlling spittle bugs, grasshoppers and other insects which require extra killing power. Other Black Leaf Toxaphene products are: 40% wettable powder suitable for spraying; 20% dusts (with and without Sulphur); and 40% concentrate for manufacturing dusts.

Weed Killers: Black Leaf 2,4-D Amine Weed Killer and Black Leaf 2,4-D Ester Weed Killer are available in Midwestern and Northwestern grain-producing areas for control of noxious weeds and certain other plants infesting grain crops.

For House and Garden Use: In addition to the products listed above, the Black Leaf family includes pest control products conveniently packaged for house and garden use, such as: Black Leaf 40®, Black Leaf Aerosol Insect Killer, Black Leaf Arsenate of Lead, Black Leaf 1.00% Rotenone Dust, Black Leaf 50% DDT Wettable Powder, Black Leaf Garden Dust, Black Leaf 5% Chlordane Dust, Black Leaf Warfarin Rat and Mouse Killer Concentrate and Black Leaf Warfarin Rat and Mouse Killer Mixed Bait.

Every Black Leaf pest control product is attractively packaged and carries full directions. If you desire additional information, communicate with the address below. Your inquiry will receive prompt attention.

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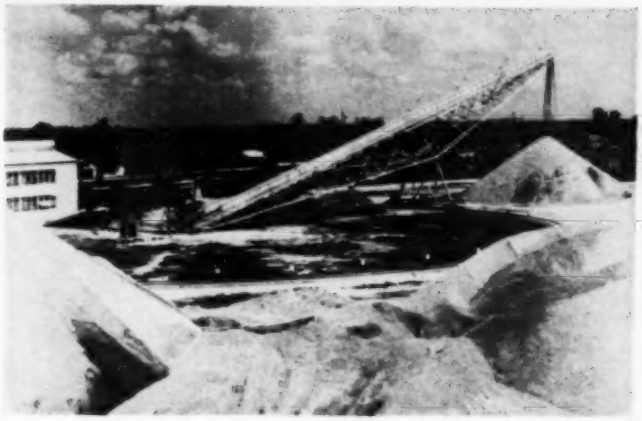
New Type Storage System for Cyanamid



American Cyanamid Co., New York, recently announced that a new type phosphate storage system was installed in their Brewster, Fla., plant. The new system, according to the announcement, includes a rotary stacker conveyer and underground tunnels for blending for more effective use of the storage facilities and the mines themselves.

The new system operates by bringing rock from two nearby phosphate mines in hopper-bottom cars which empty directly into a track hopper. Here the rock is fed onto a 36" conveyer belt running up an 80 foot high stacker which pivots over a large semi-circle. This distributes the various grades of phosphate rock to the appropriate piles below the conveyer.

Directly under the different grades of rock are evenly-spaced openings into a continuous underground tunnel. The openings are controlled by gates. By using the gates, grades of phosphate rock can be blended by proportioning the desired grades of rocks through the openings and onto conveyor belts. The tunnel divides at its midpoint and two transfer conveyors carry the rock out of the tunnel into the plant.

New Fert. Plant in Okla.

A new 20,000-ton-per-year superphosphate and fertilizer mixing plant is now in full production at Bartlesville, Oklahoma, according to a recent announcement by Chester C. Crawford, president of Sunset Fertilizer Company. Truck and rail shipments are being made to dealers in Oklahoma, Kansas, Missouri and Arkansas.

The new plant, with extensive facilities for producing a complete line of mixed fertilizers, occupies several large buildings on an industrial site in west Bartlesville.

"Fertilizer use has increased twenty fold during the past ten years in this area," Mr. Crawford said. "With farmers aiming for peak production and fertilizer in short supply, we are doing everything we can to meet the heavy fertilizer demand on the 200,000 farms within easy reach of Bartlesville."

Mr. Crawford is well known to the fertilizer industry. He was vice-president and sales manager of Phillips Chemical Company before organizing this new manufacturing and marketing operation.

•

New Ammonia Transfer

A new compressor for transferring anhydrous ammonia from tank car to storage tank is being produced by Worthington Pump & Machinery Corp., Harrison, N. J. The unit transfers not only the ammonia, but also the residual vapors which remain in the tank car after it has been emptied of liquid. These vapors can represent as much as 800 to 1200 gallons of ammonia.

•

To Sell Cesco Dumper

The Cesco Dumper is now being manufactured and serviced for eastern users by Essex Conveyor, Inc., Newark, N. J., and for users west of the Mississippi by Colson Equipment & Supply Co., Los Angeles. This equipment lifts and dumps any free flowing material, handling bags, bulk and drums. It has a lifting capacity up to 1500 lbs. and is made in standard dumping heights from 5 to 12 ft.

•

Delaney Hearing Continues

The Delaney Committee was to conduct a series of hearings beginning February 13, on the growing practice of fluorinating public water supplies for the purpose of reducing dental decay. Hearings were scheduled for February 13, 19, 21 and 26.

•

New Dust Filter

W. W. Sly Manufacturing Co., Cleveland, 2, Ohio, has available a folder describing application of its "Sly Dynaclone" cloth type filters for collecting industrial dusts. Constant cleaning of all filter bags in the system is said to provide uniform suction which is important in venting all kinds of grinding and pulverizing mills. Copies of the folder are available.

•

CFA Announces Meeting

The California Fertilizer Association has announced the time and place of its 1952 meeting as being at the Desert Inn, Palm Springs, Calif., November 10, 11 & 12. According to Sidney H. Bierly, secretary, business sessions are scheduled on Monday and Wednesday, with Tuesday, Armistice Day, devoted to recreation. Byron Reynolds, Bandini Fertilizer Co., Los Angeles, is program chairman for the 1952 meeting.

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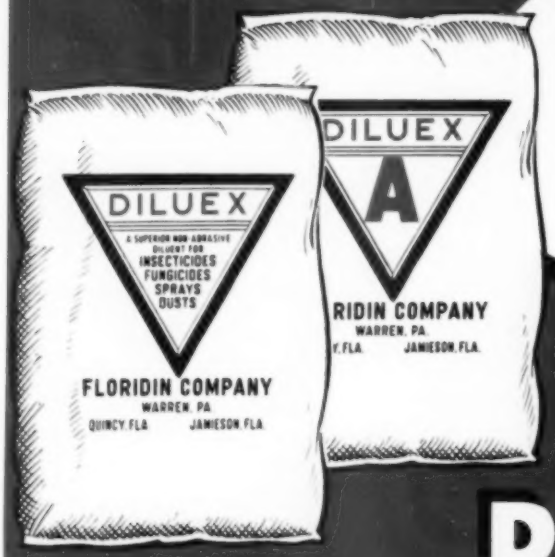

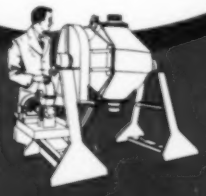

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Pesticide Formulations

For proof of acceptance, we have referred in the past to users of DILUEX whose annual consumption amounted to trainloads. Whatever statement was made in such terms a year ago would be an understatement now. On merit, the demand for DILUEX has multiplied.

In impregnating liquid toxicants—milling DDT, BHC, or other organics—conditioning blended dusts, DILUEX gives the greatest assurance of quality in the finished product.

Production facilities have been enlarged to keep pace with all anticipated requirements. Inquiries and orders will receive prompt attention.

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Book Reviews

Field Crops by H. C. Rather and C. M. Harrison. Second Edition. Published by McGraw Hill Book Co., Inc., New York. 446 pages, 6 x 9 inches, cloth binding, price $5.50

Practices used in growing crops, planting, distribution, management, harvesting etc, are reviewed in this text, which is designed especially for use by agronomy students and persons interested in studies related to agriculture. A chapter on "Soil Conservation and Management" deals with the application of fertilizer to crops and pasture, crop rotation, and maintenance of soil productivity. In discussing the major crops, common pests and their control are included in the text. More than 120 illustrations are contained in the book.

■

Handbook of Dangerous Materials by N. Irving Sax. Published by Reinhold Publishing Corp., New York. 848 pages, 7 x 10½ inches, cloth binding, price $15.00.

Hazardous properties of some 5000 materials are compiled in this book, including data on maximum allowable concentration, toxicity, flammability, storage and handling, physical properties, formulas and shipping regulations. The author indicates in the preface, that where it was possible, information is given on symptoms, treatment and antidotes, first aid suggestions, personnel safety precautions, fire extinguishing agents etc.

The book is divided into five main sections. The first section of over 400 pages is concerned with general chemicals, listing about 5,000 materials alphabetically. Included in this section are some of the insecticides such as DDT, BHC, chlordane, parathion, etc. We noted in spot-checking the book, however, that lindane, dieldrin, and aldrin were not listed. Still, the compilation in one volume of hazardous data on the 5,000 materials listed makes this book useful to anyone involved in handling and shipping "dangerous" materials.

Section two, of about 150 pages deals with explosives; section three of about 60 pages contains discussions on fungus diseases and the toxicity of fungicides; section four, of 70 pages, is concerned with radiation and radiation hazards; while the complete text of Interstate Commerce Commission Shipping Tariff, as issued by the Bureau of Explosives, is contained in section five.

●

Agricultural Chemistry Volume two, edited by D. E. H. Frear. Published by D. Van Nostrand Co., Inc., New York. 588 pages, 6½ x 9½ inches, cloth binding, price $9.50.

The applications of agricultural chemistry are discussed in a series of 24 chapters, written by 23 recognized specialists in the various fields, and compiled in this second volume on agricultural chemistry. The text is divided into five main sections: Chemistry of Major Agricultural Products, covering seed, fruit and vegetable crops, meat, milk and poultry products; Fertilizers and Soil Amendments, including nitrogenous, potassium and phosphate fertilizers, as well as liming materials; Nutrition of Farm Animals; Pesticides, including insecticides, fungicides, and herbicides; and Commercial Agricultural Chemistry, which deals with agricultural patents, and chemurgy.

The book is designed for persons having a good general knowledge of inorganic and organic chemistry. It contains a full bibliography at the end of each chapter, is well illustrated and classified.

●

New Bag Closing Machines

Union Special Machine Co., Chicago, announces two new machines, Style 21800 P and 21800 R, the latest two models in their Class 21800 table-type bag closing machines. Style 21800 P is a high production machine, equipped with a 6 ft. conveyor, specially designed for closing medium to large textile or paper bags, using 80600 or 14500 head. Style 21800 R is a similar machine for use with Vibrox packer. Both machines make plain sewed or tape bound closures, and each has a capacity of 2,800 100-lb bags per 8-hour day.

●

Mathieson Sales Gain

Mathieson Chemical Corp., Baltimore, reported net sales of $91,234,076 for 1951, a twenty percent increase over 1950 sales which were $75,775,757. Earnings reached the record level of $9,652,993 in 1951. During the past year Mathieson brought a new BHC plant into production at Niagara Falls, N. Y. Other expansion programs were completed at the Houston, Tex. fertilizer plant and the Lake Charles, La. anhydrous ammonia plant. Three insecticide mixing plants were completed at Little Rock, Ark., Williamston, N. C., and Houston, Tex.

Chase Ups Alexander

Eugene P. Alexander, Chase Bag Company sales representative, has been transferred from the company's Cincinnati territory to its Detroit sales office.

E. P. ALEXANDER

The announcement came from R. N. Conners, vice-president and general sales manager, who said Mr. Alexander's successor in Cincinnati will be D. L. Herrick, formerly of the Chase Milwaukee branch.

●

To Produce IPC

Commercial production of IPC (Isopropyl N-phenyl carbamate) has been announced by Edward Schuler, general sales manager of Monsanto Chemical Company's Western Division.

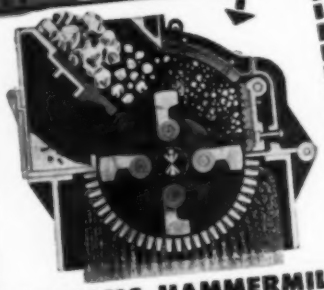
The chemical is being made at the division's plant at Santa Clara, Calif. It will be available through the company's domestic and foreign sales offices.

●

Lion Oil Expands Plant

Lion Oil Company has announced a five million dollar expansion program at its refinery in El Dorado, Arkansas, to supplement existing manufacturing and operating facilities. T. M. Martin, company president, said that contracts are in preparation covering the design and construction of new process units which will include a catalytic cracking unit with integral vapor recovery equipment and a 1150 barrel-per-day alkylation plant.

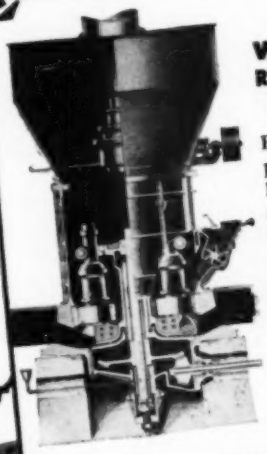
YOU NAME IT... WE CAN GRIND IT!



WILLIAMS HAMMERMILLS

Heavy duty for crushing and grinding rock phosphate, gypsum, limestone and similar materials.

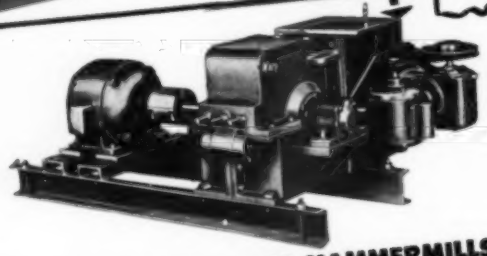
Also for disintegrating ammonium sulphate lumps and fertilizer mixes that "set-up" in storage.



WILLIAMS ROLLER MILLS WITH AIR SEPARATION

For pulverizing rock phosphate, gypsum, limestone, sulphur for dusting, etc. Used for blending and pulverizing insecticide mixes such as BHC, DDT, and toxaphene but in higher concentrations than Hammermills will handle.

WCR1-9



WILLIAMS HELIX-SEAL HAMMERMILLS

For grinding, disintegrating and blending insecticide mixes, such as BHC, DDT, toxaphene, etc., in concentrations ready for use.

W.T./M.G.P.*

***WILLIAMS TESTING...MEANS GUARANTEED PERFORMANCE**

Submit your grinding problems to Williams. A sample of the material and description of the desired result will set our facilities to work on a solution to your problem. Visits during test runs and technical consultations are invited.

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WILLIAMS

CRUSHERS GRINDERS SHREDDERS

LARGEST MANUFACTURER OF HAMMERMILLS IN THE WORLD

New S Production Mark

The U. S. Department of Defense has announced that a new production record was established in 1951 by the domestic sulfur-mining industry. Production of native sulfur exceded 5,278,249 long tons, which is 2% more than in 1950.

Output exceeded 400,000 long tons in every month, reaching the highest levels during the third quarter in which the monthly average was 456,523 long tons.

In the fourth quarter it declined to an average of 438,096 long tons.

Over a period of years prior to 1951, producers' stocks of sulfur declined continuously as sales exceeded production. By 1951 stocks were so low that this practice could no longer be continued and consequently less sulfur was shipped from the mines than in 1950.

Similarly, apparent sales in 1951 of 5,095,347 long tons were 10 percent below 1950. At the end of 1951 producers' stocks totaled 2,837,432 long tons.

•

Mo. Host to June Meeting

The Corn Belt section of the American Society of Agronomy will hold its annual meeting at the University of Missouri, Columbia, June 9 to 11, it has been announced. The school expects to be host to some 400 agronomists representing 16 states.

On the program will be a soil survey workers tour, a soft-wheat breeders' conference and a general tour of experimental areas in the vicinity.

•

New Texas Grinding Plant

A new sulfur-grinding plant to be operated by the Southwestern Fertilizer Co., Pecos, Texas, is under construction. The firm expects to grind sulfur and ship it by rail for use in fertilizer manufacture. The plant will be located on a spur of the Texas and Pacific railway.

•

Phillips Sets Safety Mark

Employees of Phillips Chemical Company's Cactus plant near Dumas, Texas, have just completed 1,000,000 man-hours without a lost-time accident, according to an announcement by K. S. Adams, chairman, and Paul Endacott, president, of both Phillips Petroleum Company and this wholly-owned subsidiary.

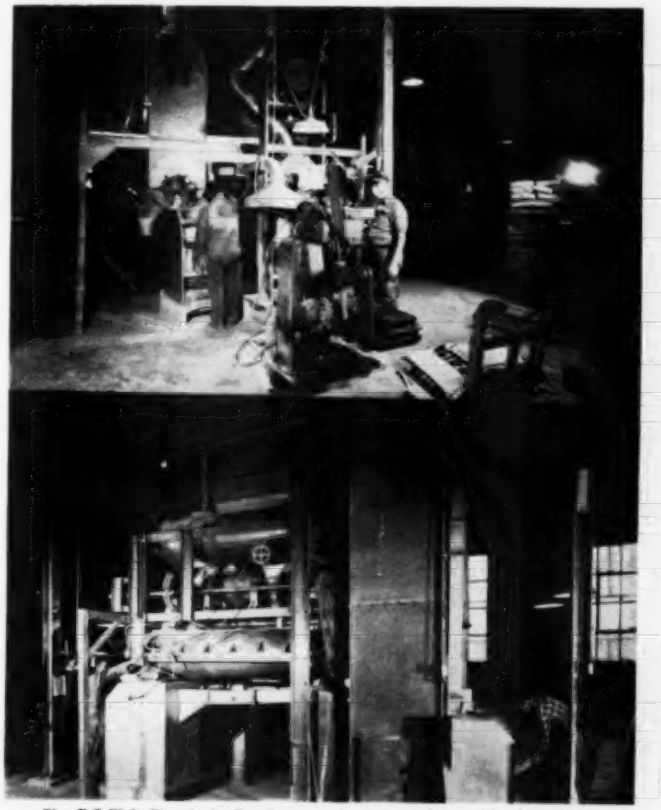
The safety record, representing a total of 287 consecutive days for the 630 employees, is the second such accomplishment in the plant's history. The previous record was established on November 18, 1949.

C. W. Forman is superintendent and R. G. Diserens is safety supervisor of this plant which manufactures anhydrous ammonia and ammonium nitrate.

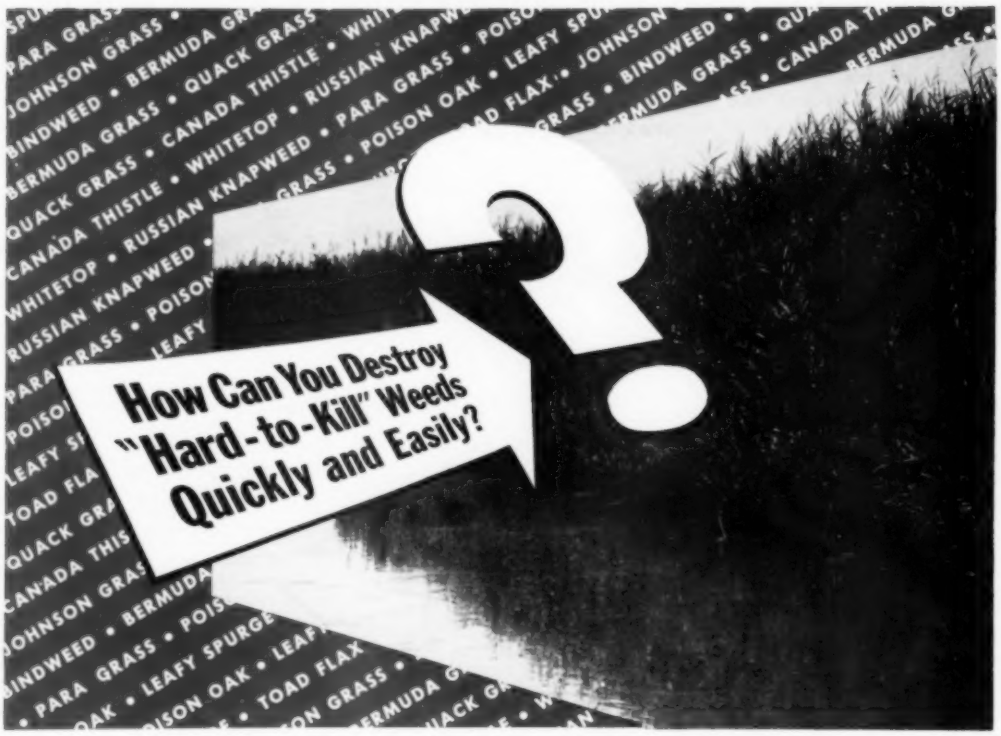
Superphos Pricing Order

A specially drafted pricing regulation covering superphosphates was expected to be issued about March 1, following a January conference between members of the Superphosphates Industry Advisory Committee and OPS officials. Part of the industry is now pricing under GCPR, and part under Manufacturers' Ceiling Price Regulation CPR 22. When the new regulation is issued, it will replace these former controls with dollars and cents ceilings for superphosphate sales at various production points across the country.

Lansing Plant Installs New Equipment



The E-Z-FLO Chemicals Co., Lansing, Michigan, has recently installed Sprout-Waldron intimate blending equipment for the formulation of parathion insecticides. The machinery has reduced greatly the toxic dust hazard in connection with formulating the insecticide, the company states. Lower photo shows a side view of the system and bag dump, while the upper picture shows the discharge and packaging area. (Photos by Sprout-Waldron Co.)



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POLYBOR-CHLORATE 88 destroys *all* vegetation when applied properly; the combined effectiveness of borates and sodium chlorates in spraying gives fast killing action by contact plus a *residual effect* for root-action. This remarkably potent, general-purpose weed killer is ideal for spraying; it is highly soluble, nonexplosive and non-fire hazardous! POLYBOR-CHLORATE 88 is especially useful for the quick destruction of tall standing vegetation where mowing or scalping is neither feasible nor desirable. Applications may be made to deep-rooted perennial weeds during these fall and winter months. Send for further information now!

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Insecticide Group Meets in Louisiana

By Kirby L. Cockerham

ABOUT 125 members of industry met with representatives of the Louisiana Agricultural Extension Service, and the Louisiana Agricultural Experiment Station at the Virginia Hotel, Monroe, Louisiana, on January 10th and 11th, for the second Annual Louisiana Insect Control Conference. K. L. Cockerham, entomologist, Louisiana Agricultural Extension Service, served as general chairman of the conference and Lewis P. Harris and L. F. Bewick of the Cotton States Chemical Company, West Monroe, Louisiana, served as chairmen for reservations and local arrangements.

The objective of the meeting was pointed out to include three links in insect control—*Research*, to find the way; *Extension*, to show the way; and *Industry*, to supply the materials and equipment. There can

In The Photos

Top picture (L to R): E. H. Floyd, entomologist, Louisiana Agricultural Experiment Station; J. E. Morrow and Wayne C. Montgomery, both of Aluminum Ore Co.; I. J. Becnel, Freeport Sulphur Co.; and C. E. Smith, entomologist, Louisiana Agri. Exper. Station.

Second photo: "Bud" Weil, Dow Chemical Co.; L. D. Newsom, Entomologist, Louisiana Agri. Exp. Station; and John S. Roussel, entomologist, Louisiana Station.

Third photo: Sterling Bain, planter, Bunkie, La.; Loy H. Taylor, Sr., Wilbanks Farm Equipment Co., Bossier City, La.; K. L. Cockerham (standing), recently-elected president of Cotton States Branch, A.A.E.E., extension entomologist, Louisiana Station; Herb West, Chapman Chemical Co.; and Durwood Newton, planter, Bunkie, La.

Fourth photo: J. Hallam Boyd, member of executive committee, National Agricultural Chemicals Association; Bob Harnden, vice-president, Chapman Chemical Co.; Rudolph G. Strong, Stauffer Chemical Co.; T. H. Tennent, Ethyl Corporation; and E. A. Epps, Jr., chief chemist, Louisiana State Department of Agriculture, Baton Rouge, La.

Bottom photo: Truman Thomas, Shreveport, La.; Harry Hawthorne, Dixie Chemical Co.; Fred Gauthier, United Seed & Feed Co., Bunkie, La. and Ben B. Heifner, Chapman Chemical Co.

—(Photos furnished by the author)

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LEAD ARSENATE Standard Astringent Basic	**CALCIUM ARSENATE** Standard Low Lime	**DDD** Dust Base (50% DDD)	**FERBAM** Dust Base (76% Ferric Dimethyl Dithiocarbamate)
ZIRAM Dust Base (76% Zinc Dimethyl Dithiocarbamate)	**2,4-D** Acid, Amine, Esters Formulations	**2,4,5-T** Acid, Amine, Esters Formulations	**TCA SODIUM SALT** 90% Dry Powder 50% Liquid Concentrate
ORCHARD BRAND SPRAYS & DUSTS	**POTASSIUM CYANATE** Technical Cotton Defoliant	**ALDRIN** 20% Dust Base	**DINITRO** Pre-Emergence Herbicides

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be no weak link in the chain if satisfactory results are to be expected. The significant increase in the use of insecticides was shown to parallel the increase in cotton production in Louisiana, which in 1951 led all non-irrigated cotton-producing states in per acre yield.

Horace W. Lee, Niagara Chemical Division of Food Machinery Corporation, served as chairman of a panel on "The Insecticide Supply Situation." Other members of the panel included I. J. Becnel, Freeport Sulphur Company; W. D. Beck, E. I. duPont de Nemours & Company; P. J. Reno, Hercules Powder Company; J. Hallam Boyd, Commercial Chemical Company; J. F. White, Julius Hyman Company; and Lee Wainwright, S. B. Penick & Company. Members of the panel stated that a shortage could be expected in sulphur for agricultural use, since most production is going into defense work. It was also indicated that calcium arsenate manufacture is at a low ebb and the supply is expected to be short during the season. Ryania was stated to be in abundant supply for all anticipated needs for sugarcane borer control.

R. C. Gaines, Bureau of Entomology and Plant Quarantine, served as chairman of a panel discussion on life history, habits, description, field infestation and injury from cotton insects. Those participating in this discussion were Messrs. C. E. Smith, L. D. Newsom and John S. Roussel of the Louisiana Agricultural Experiment Station and Messrs. R. C. Gaines and G. L. Smith of the Tallulah, Louisiana, station of BEPQ. C. E. Smith served as chairman of a review of 1951 Cotton Insect Control Research in Louisiana. Messrs. Gaines, G. L. Smith, Newsom and Roussel participated in this discussion.

Outstanding discussions were presented on the application of cotton insecticides. "Rates and Timing of Application" were discussed by R. C. Gaines, of BEPQ. "Airplane Application" was discussed by Ben B. Hiefner, of Chapman Chemical Company, and "Application and Nozzle Arrangements with Ground Equipment" were discussed by C. M. Meadows of Southwest Sprayer and Chemical Company. "Insecticide Formulations" were discussed by Lyle O. Hill, Reasor-Hill Corporation, and "Insecticide Regulations" by E. A. Epps, Jr., chief chemist, Louisiana Department of Agriculture and Immigration.

"The Pink Bollworm Situation in Louisiana" was presented by S. J. McCrory, Louisiana State Department of Agriculture, and W. H. Gohmert, U.S. Bureau of Entomology and Plant Quarantine. These speakers referred to the presence of the pink boll worm in east Texas and pointed out that Louisiana cotton fields are in danger of becoming infested with this pest.

"The Cotton Situation" was presented by J. A. McDaniel, Louisiana Agricultural Extension Service.

E. R. Stamper, Louisiana Agricultural Experiment Station, discussed the "Use of Weed Killers in Louisiana Agriculture," and "Livestock Pest Control" was discussed by Charles L. Smith, BEPQ, Kerrville, Texas. E. H. Floyd, Louisiana Agricultural Experiment Station discussed "Truck Crop Insect Control" and C. E. Smith discussed "Control of Stored Grain Insects" and "General Field Crop Pests."

R. B. Dean of U.S. Fish and Wildfire Service gave an interesting description of rodent control, explaining community control of rats and mice with warfarin.

A highlight of the second day's meeting was an address given by Mr. J. G. Richard, assistant director, Louisiana Agricultural Extension Service, in which he pointed out the importance of cooperation between various agricultural agencies and stated that a better spirit exists now between state and federal agencies and industry than ever before. On the second day, a panel discussion was led by R. G. Strong, Stauffer Chemical Company, on "The Relation of Industry to Louisiana Research and Extension Entomology." Only members of industry participated in this discussion and all stressed the importance of cooperation and working together for the advancement of insect control.

Two educational moving pictures were presented at the meeting, one on "Cotton Insect Control" through the courtesy of Hercules Powder Company, and the other was a CAA-sponsored picture showing the use of the airplane in agriculture.★★

•

Elected to Ark. Post

Joe Hardin, Grady, Ark., president of the Arkansas Farm Bureau Federation, has been elected president of the Arkansas Farmers Plant Food Company of North Little Rock, Ark. He succeeds Ralph Hudson of Harrison, Ark., who has been president of the fertilizer company since its incorporation in 1949. Clifford Smith is executive manager.

Mr. Hardin's election ends a controversy between members of the Arkansas Farm Bureau Federation, who are owners of much of the fertilizer plant's stock, and members of the Arkansas Farmers Association, which holds the sole right to market fertilizer produced at the North Little Rock plant. Both organizations issued statements approving Hardin's selection as head of the company.

•

Bangor, Me., Elects Totman

James C. Totman, manager of Summers Fertilizer Co.'s Bangor, Maine, branch, was recently elected president of the Bangor City Council which is equivalent, under Bangor's form of Government, to Mayor. At thirty-one, he is the youngest Mayor Bangor has ever had and his election marks completion of his three years as member of the City Council.

Mr. Totman is also a member of the Maine State Legislature and has filed for reelection in the June primaries.

•

Takes Potash Territory

Ben R. Pickering has been appointed northeastern sales representative by U. S. Potash Co., according to Dean R. Gidney, sales manager. Mr. Pickering will continue to make his headquarters in New York.

Producing Nitrogen At Full Capacity!

Phillips 66

Phillips is producing nitrogen fertilizer materials at full capacity. But even our tremendous rate of production isn't always sufficient to meet today's demand. We'll do our best for you. Keep us in mind if you need nitrogen in any form.

AMMONIUM SULFATE—Phillips *66* Ammonium Sulfate is a free-flowing 21% nitrogen material! Mixes easily! Uniform crystals resist caking! Ideal for high-analysis mixed goods! A fine direct application material!

AMMONIUM NITRATE—Phillips *66* Prilled Ammonium Nitrate contains 33% nitrogen. The small, coated prills or pellets resist caking . . . handle easily. Phillips *66* Prilled Ammonium Nitrate can be depended on for uniform, free-flowing properties and top-notch crop response.

NITROGEN SOLUTIONS—More N per dollar! Phillips *66* Nitrogen Solutions are well suited to the preparation of high-analysis fertilizers and the ammoniation of superphosphate. These three nitrogen solutions keep handling costs low . . . promote rapid, thorough curing!

ANHYDROUS AMMONIA—Tank car shipments of Anhydrous Ammonia (82% nitrogen) go out to Phillips contract customers from Phillips production facilities in the Texas Panhandle. Write our nearest district office for full information.

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Pacific AAEE Meeting Date

Officers of the Pacific Branch, American Association of Economic Entomologists, have announced that the group's annual meeting will be held June 24-26, which is a week later than was originally planned. The later date was announced by Leslie M. Smith, University of California, Davis, secretary of the branch.

•

DDT in Fertilizer in N. C.

Sales of fertilizer with DDT added have been approved in North Carolina by the Commissioner of Agriculture and the Board of Agriculture. However, two conditions are imposed for such sales: first, "all manufacturers formulating and offering for sale in North Carolina, fertilizers containing the insecticide DDT, shall register such brands or mixtures with the North Carolina Department of Agriculture", and second, that "each bag of fertilizer must bear a RED tag, size 3⅛ x 6¼". The tag should bear information as to the amount of DDT contained per hundred pounds and other specific details of the mixture.

The use of DDT is recommended by the Department only in areas where the white fringed beetle is present, and then only on the advice of a Federal or State entomologist.

•

Leaf-Roller Control

An apparent resurgence of the red-banded leaf roller in New York state raised questions as to whether recommended spray programs were really effective, if the timing of sprays in 1951 was inaccurate, whether spray coverage was inadequate, or whether the insect was becoming resistant to available insecticides.

Entomologists at the Experiment Station at Geneva answer these questions and suggest possible remedies for the situation in 1952 in the current issue of "Farm Research", the Station's quarterly magazine.

"Recommended leaf roller insecticides continued to perform well in 1951 experimental tests," say Dr. E. H. Glass and Dr. P. J. Chapman in their report. "This would seem to refute the idea that a resistant strain of the insect had developed or that the spray schedule was inadequate."

Proper timing of the spray applications is important and varies according to the insecticide used, the Station scientists assert. Earlier experiments have shown that DDD and parathion were effective in combating leaf roller. Against the second brood it has been demonstrated, however, that parathion should be applied early in August while the second brood worms are small. DDD, on the other hand, may be used at any time from the middle of the second brood hatching until late August. One application of parathion or DDD is sufficient, if properly timed and applied to the under surface of the leaves where the worms are feeding. Pruning to permit ready coverage of all parts of the tree with the spray will make control easier.

WETTABLE POWDER INSECTICIDE SUSPENSIONS

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THE MORE EFFECTIVE
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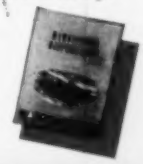
Stable dispersions of DDT, BHC, Sulfur . . . in fact any insecticide formulated as a wettable powder . . . are easily obtained by the addition of one to two percent Marasperse. With Marasperse added, spray tank contents are maintained at a uniform concentration. Insecticides are uniformly applied for maximum effectiveness throughout the spraying period.

Because it is a non-hygroscopic and free-flowing powder, Marasperse facilitates grinding and blending operations. It can be stored indefinitely without caking or deteriorating.

The powerful dispersing action of Marasperse is unaffected by the hardest waters. Marasperse enhances the action of wetting agents and permits the use of reduced amounts of these high cost components in formulations. A neutral compound, Marasperse will not affect toxicity of the insecticide.



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LION ANHYDROUS AMMONIA— Manufactured in Lion's modern plant, to an 82.25% nitrogen content under accurate chemical control, the uniformity and high quality of this basic product are assured.

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LION NITROGEN FERTILIZER SOLUTIONS— Made specifically for the manufacturing of mixed fertilizers, these products supply both ammonia nitrogen and nitrate nitrogen in the ratios desired. They are easily handled and available in three types designed for varying weather conditions,and for formula requirements in the production of fertilizers that cure rapidly, store well and drill evenly.

LION AMMONIUM NITRATE FERTILIZER— The improved spherical white pellets in this product contain a guaranteed minimum of 33.5% nitrogen. They flow freely, resist caking and store much better. Lion Ammonium Nitrate Fertilizer is shipped in 100-pound, 6-ply bags with two moisture-proof asphalt layers.

LION SULPHATE OF AMMONIA— This new, superior-type sulphate is guaranteed to contain a minimum of 21% nitrogen. Through special conditioning of the larger crystals, moisture and free acid content is greatly reduced. These factors, together with the special coating applied, make for greater resistance to caking in shipment or in storage. This product flows freely. It is shipped in bulk and in 100-pound, 6-ply bags laminated with asphalt.

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Technical advice and assistance to fertilizer manufacturers in solving their manufacturing problems is available for the asking...just write.

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Chemical Division • El Dorado, Arkansas

Naco Rebuilds Fla. Plant

Plans for the construction of a $650,000 unit to replace the fertilizer mixing plant which was destroyed by fire at Fort Pierce, Florida, on November 3rd, have been announced by Kenneth D. Morrison, president of the Naco Fertilizer Co.

The new, modern-design unit with a rated capacity of 75,000 tons yearly, will be built at Fort Pierce near the site of the old plant, one mile to the north of the city.

According to A. J. Sackett & Sons, Co. of Baltimore, Maryland, designers of the building and equipment, Naco's new plant will be "unquestionably the most modern in North America."

A feature of the new concrete, steel, and asbestos building is a specially-constructed mezzanine floor with a storage capacity for 1200 tons of bagged raw material. Twenty-nine bins, each with a 300-ton capacity, will provide storage space for bulk materials.

Machinery will include four "push-button" hopper systems, all controlled by compressed air. One hopper will be used for basing only, leaving three for blending operations. Each hopper contains eight compartments, assuring the continuous operation which is so important in maintaining the high quality of complex, highly-flexible Florida formulations.

A basing and shipping operation which will allow for the unloading of four materials at one time has been designed. The shipping dock will provide storage space for 500 tons of mixed fertilizer ready for shipment and facilities for all-weather loading and unloading of materials and fertilizer.

The plant will be equipped with a four-ton mixer, which discharges into an automatic weight hopper or on to a bulk conveyor for the loading of fertilizer for bulk-spreading on pastures.

The Naco Fertilizer Company operates other fertilizer plants in Charleston and Spartanburg, South Carolina; Wilmington, North Carolina; Jacksonville, Florida; and Findlay, Ohio.

•

Geneva Insecticide Meeting

World supplies of and needs for insecticides were to be reviewed at a meeting in Geneva, last month, under the sponsorship of the Economic and Social Council of the United Nations. United States was to be represented by Earl R. Beckner, Department of State, and L. N. Markwood, OIT.

•

Buys Fertilizer Plant

W. S. Tyler, Sulphur Springs, Texas, recently purchased controlling interest in the Jacksonville Fertilizer Co., Jacksonville, Tex. Formerly a minority stockholder, Mr. Tyler purchased the stock of Henry Taylor, Jr., to become president and general manager of the plant. James Ward is assistant manager of the operation. Mr. Taylor has moved to Des Moines, Iowa, to take another position in a food company.

What goes into BAGPAK® service to make it so dependable?

Pulp wood from I.P.'s own woodlands, converted into kraft at I.P.'s own paper mills, and made into bags in I.P.'s own bag plants. Practically everything that goes into the manufacture of a Bagpak bag is furnished by the facilities of International Paper.

"you can bank on Bagpak!"

Bagpak has been manufacturing multiwall paper bags since 1928 — makes all kinds of multiwalls, in basis weights to meet any strength required, in a complete size range, without printing or with "non-smear" printing up to four colors.

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Five different I.P. Mills supply bag kraft — not only Natural but also Colored Kraft Paper, as well as Polyethylene Liners, Asphalt Laminated Kraft and Wet Strength Paper. Each bag mill is located on two or more different railroads. Two traffic departments assure prompt delivery.

"you can bank on Bagpak!"

for heavy duty multiwall bags: — bags, bag closing materials, car liner, palletized shipments when required, packaging machines and scales — all from one source of supply! Staffs of experts help you with bag designs and packaging problems.

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S. D. Weed Conference

The South Dakota Weed & Pest Conference will be held at Huron, S. Dakota, March 20 and 21 in the Huron Auditorium. It is sponsored by the South Dakota State Weed Board in cooperation with Extension Service, South Dakota State College, and the State Department of Agriculture. Exhibits will show the latest in materials, equipment and methods for weed and pest control. Chas. J. Gilbert is state weed supervisor.

•

IMC Expands Sales Dept.

The Potash Division of International Minerals & Chemical Corporation has expanded its Industrial Sales Department to handle the increased volume of chemical production resulting from the purchase of Innis, Speiden & Company in July 1951, according to A. Norman Into, vice-president in charge of the division.

The Industrial Sales Department has been responsible for the sale of technical and chemical grades of potassium chloride and potassium sulfate produced at the Potash Division minesite in Carlsbad, New Mexico. Now, with the acquisition of Innis, Speiden, it is also selling a complete line of caustic potash and potassium carbonate together with chlorine and various other chlorinated products produced at its chemical plant in Niagara Falls, N. Y.

Newcomers to the department's Chicago offices are Carl H. Barber and J. A. Sheehan. Paul W. Hiller and John E. Batchelder, formerly with Innis, Speiden & Company, now sell from the department's New York City offices. Mr. Hiller is New York district manager of chemical sales. The department also has a newly created technical service under T. E. Allen.

•

Monsanto Appts. Thomas

B. E. Thomas, St. Louis, has been appointed director of foreign manufacture for Monsanto Chemical Company's Organic Chemicals Division, it has been announced by John L. Gillis, vice president and divisional general manager.

Mr. Thomas will be responsible for the utilization of the division's processes in the company's foreign operations, as well as the employment, training and salary administration of Organic Division technical personnel.

•

Eston Expnds Facilities

Eston Chemicals, Inc., has recently expanded its plant facilities and general office accommodations in Los Angeles, the company has announced. This expansion also includes the introduction of several new processes for the manufacture of agricultural chemicals.

The company has extended an invitation to those attending the National Agricultural Chemicals Association meeting in San Francisco in April, to "drop down to Los Angeles and visit the plant at 3100 E. 26th St."

COPPER SULPHATE

Crystals - Superfine - Powdered

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•

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The High Test Nutritional Basic Zinc

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(Neutral Manganese)

The High Test Nutritional Manganese

55% Mn as Metallic

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Mixers

Give You Every Advantage for Quick, Thorough, Economical Mixing

• Hand Lever controls receiving and discharging
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• Hand Wheel operates rack and pinion slide gate
• Heavy, massive mixing drum
• Swing chute for receiving and discharging
• Mixing scoops assure thorough mixes
• Man size opening for easy cleaning

The Sturtevant Dry-Batch Mixer is an efficient rotating drum-type machine for mixing various substances together into a homogeneous and inseparable whole, every part of which presents the same analysis. The substances may be of different weights and physical properties, and may be either dry, partly dry, or a mixture of both.

Because of the unique design of its mixing chamber, and the 4-way mixing action which brings two or more substances together, the Sturtevant Dry-Batch Mixer does a more rapid mixing job than other machines and, at the same time, it is complete and thorough in every particular.

Write for bulletin today.

STURTEVANT MILL COMPANY

123 Clayton Street, Boston 22, Mass.

Designers and Manufacturers of:

CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS
ELEVATORS • MIXERS
MECHANICAL DENS and EXCAVATORS

Compare These Advantages

- Only one lever controls both receiving and discharging for simplicity of operation. Hand wheel operates rack and pinion slide at feed opening.
- 4-way mixing action speeds production...assures thorough blends.
- "Open-door" accessibility permits easy, fast, thorough, cleaning.
- Single aperture drum for both intake and discharge.
- Unusually efficient scoops pick up materials to effect thorough mixing as drum revolves.
- 5 models . . . a size for every mixing job . . . smallest size mixes up to 7½ tons per hour . . . largest size up to 75 tons per hour.

CSC Merger Plans Off

J. Albert Woods, president of Commercial Solvents Corp., New York, and John S. Zinsser, chairman of the board of Sharp & Dohme, Inc., have announced that possible plans for merger of the two companies, which have been under consideration, have been abandoned.

•

W.A.R.F. Issues Booklet

Wisconsin Alumni Research Foundation, Madison, has published the first issue of its "News & Reviews", designed to be an informative news digest for county agents, vocational agricultural instructors and other agricultural leaders. According to Ward Ross, managing director of the Foundation, issues are expected to appear at intervals of approximately two months. Copies are available from the foundation, P. O. Box 2051, Madison, Wisconsin.

•

Thompson Changes Name

Thompson Horticultural Chemicals Corp., St. Louis, has changed its corporate name to "Thompson Chemicals Corp.", according to Wm. T. Thompson. No changes have been made in management, personnel or policies, Mr. Thompson states. The name change was made solely in the interest of brevity. The firm has been in operation for 22 years.

•

Naco Promotes Fuchs

Albert Fuchs has been named manager of the Insecticide Division of the Naco Fertilizer Company plant at Charleston, S. C., according to a recent announcement made by Kenneth D. Morrison, president.

Mr. Fuchs, who has been a member of the Naco staff since 1944, has been assistant manager of the Charleston branch since 1948.

•

Ark. Restricts 2,4-D Use

Use of airplanes for spraying rice fields will be prohibited within one and one-half miles of growing cotton, the Arkansas State Plant Board has ruled, following three public hearings on complaints against prevalent spraying practices. The ruling was designed to resolve a controversy between rice planters and cotton growers on the use of 2,4-D and other herbicides. Many cotton farmers have protested that sprays applied by airplane had drifted onto adjoining fields, damaging cotton and other broad-leaved crops.

Floyd Fulkerson of Baucum, Ark., chairman of the Plant Board's 2,4-D committee and a large-scale cotton planter of many years experience, warned the group that legislative action can be expected if cotton farmers are not protected from irresponsible application of 2,4-D. He declared that a small minority of rice planters have been negligent in applying herbicides, and urged greater care in the use of all such sprays.

The Board, with authority over application of herbicides under a 1951 law, also moved to provide greater restrictions in licensing operators and in inspection of equipment for spraying.

NEW...

COROMERC

(POWDERED MERCURY FORMULATION)

for APPLE SCAB CONTROL

COROMERC, a new member to the Corona family of agricultural fungicides, is a **dry, granular,** water soluble product. Tests at Agricultural Experimental Stations in various apple growing regions have shown this particular mercury formulation to be an excellent fungicide for the control of apple scab. Corona for the first time offers this mercury fungicide for safely burning out primary scab lesions should this disease get a foothold during a warm, wet spring when other types of fungicides are unable to hold the disease in check.

Recommended for use during the early growing season, and at ½ lb. per 100 gallons of spray solution, Coromerc is packed in 1 lb. and 1½ lb. cannisters for direct addition to most spray tanks.

Competitively priced. Write for Literature.

Your Insurance for Better Crops!

CORONA CHEMICAL DIVISION

PITTSBURGH PLATE GLASS COMPANY

MILWAUKEE, WIS. MOORESTOWN, N. J.

to give farmers
the most for their
fertilizer dollars
put

U·S·S AMMONIUM SULPHATE

in your high-analysis mixes

. . . because high-analysis fertilizers pay off handsomely for everybody involved. The bigger yields they give farmers mean better future business for you and your dealers.

High-analysis fertilizers give the best performance when U·S·S Ammonium Sulphate provides a major share of the nitrogen content. This dry, free-running material stands up in storage . . . mixes well with other fertilizer ingredients . . . is a drillable fertilizer material.

Its "all-ammonia" nitrogen won't leach out of soil, yet it converts to readily-available form in the growing season.

Demand for high-analysis fertilizers will be heavy this spring . . . for row fertilizers in corn planting and for dressing on small grains and pastures. Be ready for your share of this business. United States Steel Company, 525 William Penn Place, Pittsburgh 30, Pa.

U·S·S AMMONIUM SULPHATE

USS

UNITED STATES STEEL
COMPANY

Flag Appoints Nabors Mgr.

Flag Sulphur & Chemical Co., Tampa, Florida, has announced the appointment of C. Marion Nabors as general manager. Mr. Nabors is a native of Florida and has been associated with the Agricultural chemicals business for the past twenty years, with a good portion of this period being devoted exclusively to the manufacture, sale and distribution of fertilizers.

Flag Sulphur was organized in 1947 and has grown consistently since that time. It now markets its products throughout the southeast and has made numerous shipments of materials to the world markets.

•

DCAT Opposes Bill

How the Drug, Chemical & Allied Trades Section of the New York Board of Trade stands on the question of chemicals in food, was illustrated in a resolution of the DCAT Executive Committee in which it opposed registration of all food additives, as proposed in the Miller Bill, on the grounds that circumstances do not warrant an amendment to the Federal Food, Drug and Cosmetic Act similar to the requirements for "new drugs" under Section 505.

It was stated, however, that DCAT does support the position that industry should file with the Food and Drug Administration, full information on proposed food additives, including data on clinical tests, sufficiently in advance of their use to provide time for study and possible action should FDA feel it to be in the public interest.

•

Forms New Company

The Fowland Company has been organized at Pine Bluff, Ark., by Dr. Arthur Fowler, Jr. and Olline Wineland to distribute "Reed's Smoker" and "Reed's 1-3-6" Compound. The "Smoker," a tractor attachment, embodies a new principle in application of cotton pest control products. It is attachable to the manifold or exhaust pipe of any tractor for utilization of the engine head in converting liquid chemical in the smoker 'heart' chamber to a smoky vapor. This is forced through tail pipes on to the cotton plants for direct contact with the insects.

•

Hyman Ups McCauley

W. E. McCauley, for the past five years assistant sales manager and leader of entomological activities for Julius Hyman & Company, Denver, has been appointed "Manager of Agricultural Product Development" for the company's world-wide activities.

In his new position, Mr. McCauley will coordinate and direct all of the company's activities and programs dealing with the introduction, development, and promotion of its agricultural chemicals, chief of which are aldrin and dieldrin.

Mr. McCauley is an entomology graduate of the University of Illinois and is well known throughout the industry.

the difference is...

Naugatuck Chemicals

*U.S. Pat. No. 2,529,494

US AGRICULTURAL CHEMICALS

UNITED STATES RUBBER COMPANY

Naugatuck Chemical Division, Naugatuck, Conn.

manufacturers of seed protectants — Spergon, Spergon-DDT, Spergon-SL, Spergon-DDT-SL, Phygon Seed Protectant, Phygon Naugets, Phygon-XL-DDT, Thiram Naugets — fungicides — Spergon Wettable, Phygon-XL — insecticides — Synklor-48-E, Synklor-50-W — fungicide-insecticides — Spergon Gladiolus Dust, Phygon Rose Dust — miticides — Aramite.

Safety Meetings Coming

Vernon S. Gornto, Smith-Douglass Co., Inc., Norfolk, Va., secretary of the Fertilizer Safety subsection of the National Safety Council, has announced that four safety meetings are scheduled for 1952.

The North Carolina Safety meeting will be held at Ashville, N. C., May 6; the Virginia State Safety Conference in Richmond, Va., May 16; the meeting of the Advisory Committee of the Fertilizer Section of the National Safety Council, White Sulphur Springs, W. Va., June 19; and a meeting of the Fertilizer Section of the National Safety Congress, Chicago, October 22 and 23.

In addition, the Southern Safety Conference was to meet in Atlanta, Ga., on March 3, to launch a safety campaign in fertilizer plants in that area.

•

Cotton Mech. Conference

The sixth annual Beltwide Cotton Mechanization Conference will be held in the San Joaquin Valley of California, October 22-24, according to Claude L. Welch, director of the production and marketing division, National Cotton Council. The opening day's session will be held at Bakersfield. On the morning of the second day, conferees will observe a field demonstration of modern cotton production machinery. This show at the United States Cotton Field Station at nearby Shafter will highlight cotton farming practices prevailing in California. A panel discussion of various phases of cotton mechanization will conclude the day's activities at the field station.

A tour of cotton operations in the San Joaquin Valley, winding up at Fresno, is scheduled on October 24.

•

International Meet in Pa.

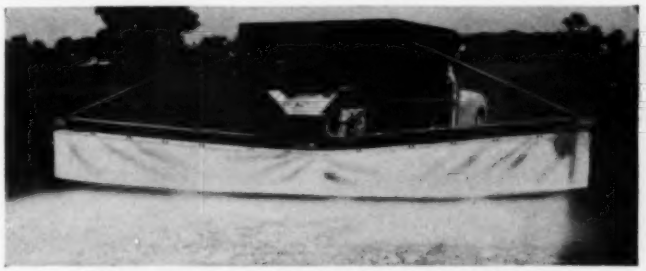
The sixth International Grasslands Congress will be held on the campus of Pennsylvania State College August 17-23, it has been announced. The Food and Agriculture Organization of the United Nations is sponsor of the Congress which is expected to attract persons from 65 nations.

Cooperating with the FAO are the Association of Land-Grant Colleges and Universities and four government agencies: the U. S. Department of Agriculture, the State Department, the Department of Interior and the Mutual Security Agency. Full details of the program have not yet been announced.

•

Isotope Meeting in June

Kansas State College, Argone National Laboratory and the Isotopes Division of the United States Atomic Energy Commission will sponsor a two-and-a-half-day conference on "The use of Isotopes in Plant and Animal Research" June 12 - 14, 1952, at Kansas State College, Manhattan, Kansas. A detailed program will be available later. Persons wishing to receive it, together with information on housing, should write Director R. I. Throckmorton, Kansas Agricultural Experiment Station, Manhattan, Kansas.



Why is Hercules

the ONLY spreader that gives uniform distribution?

If you *throw* a handful of fertilizer into a field, the heavy bits naturally go farther than the fine powders—you get *uneven* distribution. You can see for yourself why any "spreader" that *throws* lime and fertilizer *is bound to give uneven distribution.* That's why Hercules uses an entirely different principle to build a spreader that actually *spreads* fertilizer, instead of throwing it. With this exclusive Hercules principle, chain conveyors pull the material across a diagonally-cut distributor plate, so that it drops uniformly at all times.

Discharge arms fold quickly and easily for highway travel.

What's the result? Better crops. More profits. No more soil burn. No spotty concentration of materials. No waste distribution. Lime and fertilizer spread evenly, no matter what the weather, in 20-foot swaths. Gives accurate quantity control from 200 lbs. to 8000 lbs. per acre. Spreads all types of agricultural limes and fertilizers, dry or moist.

Get Hercules— the only spreader that SPREADS fertilizer instead of throwing it!

HERCULES STEEL PRODUCTS CORPORATION
Dept. 104, GALION, OHIO

Please send me—

☐ More information on the revolutionary new Hercules Spreader.

☐ Details on how I can get a profitable dealer franchise for the new Hercules Spreader.

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CITY_____ STATE_____

Hercules
STEEL PRODUCTS CORP.
GALION, OHIO

Protection that won't rain away

ARMOUR STICKER helps protect this valuable crop when it needs protection most!

Just after rainfall, insects are very active — and plants unprotected. The usual insecticides are washed away by rain, to the point where they fail to do their job. The crop is completely open to damage. That is, unless you use Armour STICKER.

During the next year, every acre under cultivation *must* produce more. With an impending shortage in phosphate fertilizer, more of the load of increasing production must be carried by insecticides and fungicides.

Armour STICKER was designed to help increase the length of time a pesticide or fungicide stays on the leaf. It reduces losses due to run-off during spraying or dusting. And, more important, STICKER becomes water-resistant after two or three hours exposure to sunlight. Thus your formulation stays on the leaf, where it is needed, when it is needed. And at harvest time, when it should come off, it washes off with usual methods, without extra labor.

STICKER is compatible with all inert materials and all commonly used protectives, such as DDT, lead arsenate, rotenone, chlordane, pyrethrum, toxaphene, etc. In dust formulations, it does not affect flowability, even when added in greater than recommended amounts. In sprays, STICKER has no effect on the viscosity of the solution.

Write today to Armour for more detailed information on how STICKER can increase the protective power of your sprays or dusts. Specifications on recommended amounts and methods of application will be sent promptly. Remember, to increase protection, formulate with STICKER.

ARMOUR *Adhesive Division*

Armour and Company • 1355 West 31st Street • Chicago 9, Illinois

Senate Group Tells How Chemicals Affect Labor

AN increasing trend toward the use of more chemicals in American agriculture is creating a farming revolution which in the next ten years may result in a possible reduction in the farm labor force of over a million and a half farm workers. This, at least, is the opinion expressed by Dr. Francis J. Weiss who has just completed a staff study for the Sub-committee on Labor and Labor-Management Relations of the Committee on Labor and Public Welfare of the United States Senate. Copies of the full report, entitled "Manpower, Chemistry and Agriculture", are obtainable through the U. S. Govt. Printing Office. The author of the report has had extensive professional experience with the Sugar Research Foundation, U.S.D.A. Sen. Humphrey H. Humphrey of Minnesota is chairman of the Senate Subcommittee on Labor and Labor-Management Relations.

Dr. Weiss opens his discussion of the role of chemicals in American agriculture today by pointing out that "chemicals have become as important to modern agriculture as the plow and the hoe". He points out that "hybridization, mechanization and 'chemicalization', that is the use of insecticides, fungicides and herbicides, has brought a phenomenal increase in yield per acre with a simultaneous decrease of man-hour requirement, as a result of which productivity has more than doubled." This replacement of the worker by use of chemicals, he predicts, "will bring down the number of farm workers (plus operators) from its 1950 level of 9,320,000 to 7,785,000 in 1960 and to 5,850,000 in 1970."

A number of interesting statistics from various sources are incorporated in the Weiss report. Fertilizer consumption, he reports, reached a figure of $892,000,000 in 1950, as compared with about $50 million in 1900, 149 in 1910, 382 in 1920, 288 in 1930 and 261 in 1940. He reports further that in 1950 members of the NACA produced more than one billion pounds of agricultural chemicals valued at about $250,000,000 at the manufacturers' level.

Losses caused annually by insect pests he estimates at about four billion dollars, with a comparable figure for losses due to fungi and plant diseases. Adding $5 billion for weed damage, he reports a toal damage of $13 billion dollars per year, some substantial portion of which can be prevented by increased use of control chemicals.

A substantial portion of the report is concerned with the activities of custom spray operators. Dr. Weiss states that in 1950 about 1,600

For Dependable

BLIGHT CONTROL

for your BORDEAUX SPRAYS and COPPER-DUST Mixtures

America's growers have been using *Triangle Brand* Copper Sulphate for over 60 years because this economical blight control method has been *proven effective*. Ask your dealer for *Triangle Brand* Copper Sulphate for Bordeaux Sprays . . . available in Large Crystals, Small Crystals, Superfine, Snow or Instant (free-flowing powder). Also *Triangle Brand* Basic Copper Sulphate for sprays and Copper-Dust mixtures.

FREE LITERATURE AVAILABLE ON REQUEST

Write today for these helpful, informative booklets . . . "Bordeaux Mixture—Its Efficient Preparation and Use" . . . "Bordeaux Controls Late Blight on Tomatoes" . . . and "Basic Copper Sulphate."

PHELPS DODGE REFINING CORPORATION

40 Wall St., New York 5, N. Y. • 230 N. Michigan Ave., Chicago 1, Ill.

Du Pont Reports on

New Developments with EPN 300 Insecticide

Du Pont EPN 300 Insecticide, which was first introduced as a miticide for apples and other fruits, is now being recommended for control of various species of mites and insects on deciduous fruits, citrus, corn, tomatoes, onions and dry beans.

Outstanding for Peaches

EPN is being officially recommended in the major peach areas of the country for control of most of the important peach insects, especially plum curculio. Tests by Du Pont and other investigators during the past season have confirmed previous indications that EPN would give effective control of various mites and insects on many other crops.

New Recommendations

The following list shows insects which have been added to Du Pont recommendations for 1952, and shows some of the states where the principal EPN tests were made:

Citrus red mite, orange mite and fruit-tree leaf roller on citrus—*California*

Peach-tree borer—*Indiana, North Carolina, South Carolina, Georgia, New York*

Lesser peach-tree borer—*Ohio, New York*

Lecanium scale crawlers and peach cottony scale crawlers—*New York*

Bud moth on prunes—*California*

Grape-berry moth—*New York, Ohio, Pennsylvania*

Codling moth on apples—*Indiana, Virginia, New York*

Codling moth on pears and walnuts—*California*

Walnut aphid on walnuts—*California*

European corn borer—*Illinois, Minnesota, Ohio, Wisconsin*

Mexican bean beetle—*Delaware, New York*

Potato aphid on tomatoes—*Florida, New York*

Two-spotted mite on beans—*California, New York*

Russet mite on tomatoes—*Ohio, Texas*

EPN is listed in the official recommendations of 10 states plus the Western Cooperative Spray Conference and eight California counties for control of various mites and insects on peaches, pears, apples, plums, prunes, grapes, apricots, cherries, nectarines, walnuts and almonds. It is also recommended for mite control on apples in seven states and two California counties.

Dust Mixtures and Low-Volume Sprays

Dust mixtures made with Du Pont EPN 300 Insecticide have proved effective in experiments against various cotton insects, European corn borer and certain other insects on field crops. Experimental emulsifiable formulations of EPN have been tested in low-volume sprays for control of grasshoppers, sugar-beet webworm, European corn borer, and certain cotton insects.

EPN Insecticide is available from Du Pont as a wettable powder. For more detailed information, write Du Pont, Grasselli Chemicals Department, Wilmington, Delaware.

DU PONT
REG. U. S. PAT. OFF.

DU PONT CHEMICALS FOR THE FARM INCLUDE:

Fungicides: PARZATE® (Liquid and Dry), FERMATE,® ZERLATE,® Copper-A (Fixed Copper), SULFORON® and SULFORON®-X Wettable Sulfurs... *Insecticides:* DEENATE® DDT, MARLATE® Methoxychlor, LEXONE® Benzene Hexachloride, KRENITE® Dinitro Spray, EPN 300 Insecticide... *Weed and Brush Killers:* AMMATE,® 2,4-D, TCA, 2,4,5-T... *Also:* Du Pont Cotton Dusts, Du Pont Spreader Sticker, PARMONE® Fruit Drop Inhibitor, and many others. ®REG. U. S. PAT. OFF.

On all chemicals always follow directions for application. Where warning or caution statements on use of the product are given, read them carefully.

150th Anniversary

Better Things for Better Living
. . . through Chemistry

companies and individual operators were flying 5,000 airplanes, and in 1951 these totals had increased substantially, with about 1,800 companies and individual operators flying 6,500 airplanes. He reports further that on the average 10 lbs. of dust or 2 gallons of solution are used per acre for insect or weed control, and that the usual service charge, exclusive of the cost of the material applied, ranges between 70¢ and $2.00 per acre. He predicts that ten years from now we will have about 20,000 planes engaged in agricultural work.

The report makes only passing mention of the work of the Delaney Committee which has over the past year or more been so active in its investigation of possible toxicity hazards in connection with the application of chemicals on food crops. Dr. Weiss does, however, review the finding of the Committee on Food Protection of the National Research Council that "DDT is not harmful to humans and the beneficial effects of a wide application of insect—, disease—, rodent—and weed destroying chemicals to farm workers and rural health must not be overlooked."

Emphasizing the essentiality of chemical supplies in agricultural production today, he reminds that "chemicals are very powerful weapons and he who wields them, whether manufacturer, distributor or operator, could use them for monopolistic practices if not restrained by proper legislation." He warns furthermore, that "the strong competitive advantage that large contiguous areas planted with the same crop offer to big farmers, especially in chemical agriculture, will constitute a strong force toward undesirable agricultural concentration if no action is taken to protect small farmers against absorption or elimination by large-scale operators."

N. CENTRAL AAEE

(Continued from Page 53)

sects"; and C. B. Eaton, "Progress Toward Uniform Survey Practices."

Another section on Apiculture and Pollinating Insects is also scheduled for Friday afternoon. It will be under the chairmanship of R. A. Grout.

Officers of the North Central Branch for 1951-52 are: R. C. Smith, president; J. H. Lilly, vice-president; J. W. Apple, secretary-treasurer. The officers are members of the executive committee which includes, in addition, C. R. Neiswnader and G. M. List.

Program committee for the St. Paul meeting, in addition to J. R. Bigger, chairman, are: T. H. Parks and T. A. Brindley. The local arrangements committee is composed of C. E. Mickel, chairman; F. G. Holdaway and A. W. Buziky.

A smorgasbord is planned to be held Thursday evening at the Lowry Hotel, with compliments of McLaughlin Gormley King Co., Minneapolis, in connection with MGK's 50th anniversary celebration.

FOR BEST RESULTS...

depend on Eston agricultural chemicals

FOR YOUR 1952 PROGRAM, USE...

ALKRON®	Parathion formulations
BROMOFUME®	Ethylene dibromide soil fumigants
ESTONATE®	DDT dust concentrates and emulsifiable solutions
ESTOMET	Organic phosphate emulsion
ESTOMITE®	Residual type miticide
ESTONOX®	Toxaphene formulations
METHYL BROMIDE	Space fumigant
TETRON®	Tetraethyl pyrophosphate formulations

You'll find Eston Argicultural Chemicals manufactured to give uniformity, reliability and maximum effectiveness . . . products that will give you the best results . . . priced to give you every profit advantage. Also . . . when you buy Eston agricultural products you get the benefit of Eston technical service. Eston technicians can help you with all your insecticide problems.
Write or wire for further information.

FOR THE BEST IN AGRICULTURAL CHEMICALS . . . IT'S ESTON!

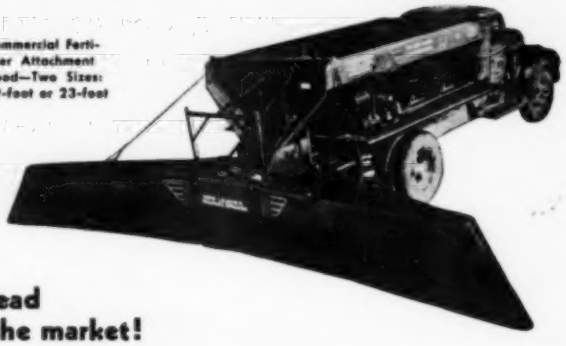
ESTON INSECTICIDES

ESTON CHEMICALS, INC.

3100 East 26th Street, Los Angeles, California

HERE'S THE ANSWER TO YOUR SPREADING PROBLEMS!

AGAIN! "The NEW LEADER" leads the field



Commercial Fertilizer Attachment Hood—Two Sizes: 19-foot or 23-foot

with its new "Motor-Driven Spreader" offering greater accuracy of spread with the most positive feed on the market!

SPECIAL ADVANTAGES — Uniformity of spread is not dependent on truck speed. Motor is mounted on catwalk and drives only the twin distributor discs at a constant speed, assuring full width of spread at all times together with uniform distribution.

Conveyor is separately driven from truck drive shaft by a series of V-belts to deliver the correct amount per acre—regardless of truck speed or regardless of whether the truck is driven in low, super-low or any other gear.

Conveyor speed is, therefore, positively synchronized with speed of the rear wheels of the truck and at each revolution of the rear wheels, the conveyor moves a given distance regardless of the truck's speed. Amount of material delivered by conveyor does not vary with hilly or soft field conditions.

Spreader Body Lengths (inside measure) are 9', 11', 13' and 15'. Other body lengths on special order.

Note: When Spreading Attachment is folded up for road-traveling position, width is approximately 7'-5".

"The NEW LEADER" Self-Unloading Bulk Transport

The 20-ton capacity transport above is shown with elevator in place and ready to load a NEW LEADER Spreader truck. These units are proving very profitable; in bad weather they eliminate demurrage on railroad cars; fertilizer gets to the job quickly and spreader trucks can be kept working in the field. The transport, being a self-unloading unit, leaves the tractor truck free to return to pick up another transport load. These units have four individual compartments of 5 tons each. Each compartment may be unloaded independently of the others. Compartments and rear endgate are removable so that bagged and packaged goods may be hauled instead of bulk loads. Capacity 5 tons to 25 tons, lengths from 11 ft. to 40 ft. Written warranty with all NEW LEADER equipment. Write today for specifications, prices, etc. Fast delivery service sells fertilizer!

FREE! Write for "The Story of a Custom Fertilizer Spreading Service"

HIGHWAY EQUIPMENT COMPANY, INC. CEDAR RAPIDS, IOWA

MANUFACTURERS OF THE WORLD'S MOST COMPLETE LINE OF SPREADERS

Antibiotics for Plant Disease

A possible role for antibiotics in the control of plant diseases is seen by research workers of the U. S. Department of Agriculture following exploratory experiments at the plant industry station at Beltsville, Md. Streptomycin sulfate was found effective in experimental work in controlling halo blight on black valentine bean seedlings. The purely experimental nature of the results was emphasized by the men who did the work, Dr. J. W. Mitchell, Dr. W. J. Zaumeyer and Powell Anderson. Practical application is still merely a future possibility.

•

Ask Data on $CuSO_4$ Exports

Exporters of copper sulfate, when making future applications to the Office of International Trade for export licenses, will now be required to report their previous "historical" position as exporters of this material. Similar information has been required for approval of exports of many other scarce materials, including various insecticides which have been in short supply. OIT has indicated, however, that stocks of copper sulfate available for export will not be allotted exclusively to "historical" exporters. A portion of each quota will be reserved for new firms.

•

Builds in Louisiana

Construction was begun February 12 for the plant which The Davison Chemical Corporation of Baltimore will build ten miles south of Lake Charles, Louisiana. To cost more than $7,000,000, the plant will produce catalyst on a large scale for the petroleum-cracking refineries of the Gulf Coast area, and other chemicals needed by the industries of the section. It will employ about 200 when it goes into production early next year.

•

BULLETINS

(*Continued from Page 75*)

sentatives, or Extension Entomologists in the cotton states.

The movie is on 16-mm. film in sound and full color. It runs approximately 40 minutes. Most of the movie is devoted to interviews with cotton farmers of the Southwest, Mississippi Valley, and Southwest, and Far West.

The movie has been well received by audiences at various insect control meetings held early this year, and requests from a large number of state groups are now being filled. Prints may also be borrowed from Hercules Powder Company, Wilmington, Delaware.

HERBICIDES

(*Continued from Page 49*)

when the plants reach the full leaf stage in the spring and are making vigorous growth. Treatments during extended drought should be avoided.

For control of mesquite with airplane spraying equipment, 2/3 pound acid of a low volatile ester of 2,4,5-T should be used in an oil-water emulsion of one gallon diesel fuel and 3 gallons of water per acre. Applica-

DO YOUR PLANE DUSTS HAVE GROUND ROLL?

Airplane dusts made with Barden Clay develop a "ground roll," covering the *underside* as well as the upperside of the leaf. Barden Clay has bottom-side coverage up to 70% or more of upper leaf surface deposit...and Barden's excellent adhesive qualities hold the toxicant to the leaf for double crop protection! Results prove that for dustability, coverage, retention and mortality, Barden Clay is the outstanding diluent. To quote one leading manufacturer, "Barden Clay is so superior we can't afford *not* to use it."

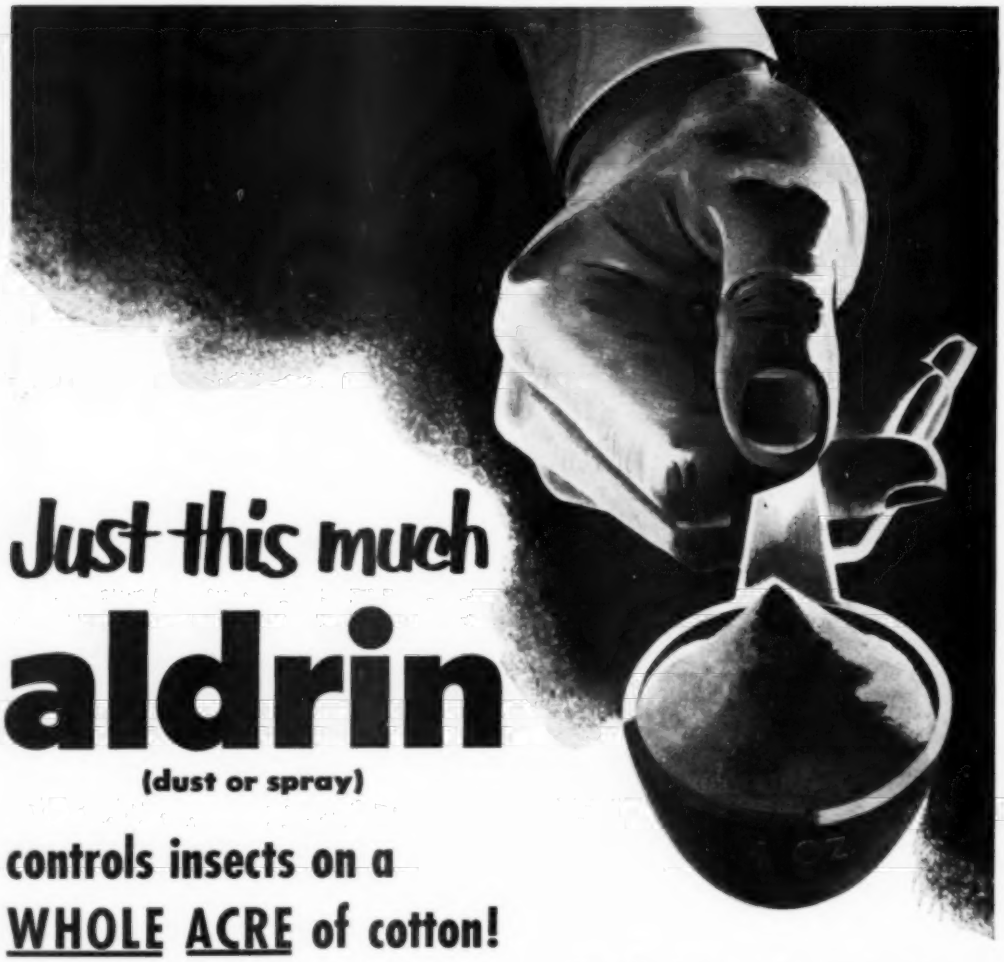
For ground or plane dusting, use Barden Clay, the scientifically-prepared diluent. It adds *extra power* to your product...*extra punch* to your sales. Samples on request.

J. M. HUBER CORPORATION
100 PARK AVENUE, NEW YORK 17, N. Y.

HUBER World's Largest Producer of Aerfloted Kaolin Clay

7-Point Barden Score	
✓	Improved dispersion
✓	Lower abrasion
✓	Better coverage
✓	Better retention
✓	Higher mortality
✓	Greater uniformity
✓	Maximum economy

For Dust or Spray... use Barden Clay— the Low-Cost Scientific Diluent



Just this much aldrin

(dust or spray)

controls insects on a WHOLE ACRE of cotton!

Aldrin's power to kill cotton insects is so great that you need only 4 ounces per acre for control. That's why aldrin is approved and recommended in every cotton state . . . and why aldrin is far and away your best buy for profitable control.

Use the best . . . it costs you less

No other cotton insecticide has aldrin's killing power in such small doses . . . *at so low a cost per acre!* Now's the time to get your aldrin . . . be ready for the first insect visit!

aldrin

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Aldrin is manufactured by Julius Hyman & Co., and is distributed by Shell Chemical Corporation, 500 Fifth Avenue, New York 18.

Aldrin is available under the brand names of leading insecticide manufacturers. Consult your local dealer and county agent.

tions should be made 50 to 80 days after the first leaves appear in the spring when there is sufficient soil moisture to insure heavy foliage and vigorous growth for 30 days prior to treatment. The spray solution should be delivered in coarse droplets to reduce drift and loss of chemicals.

Some promising results have been obtained for the control of second growth post and blackjack oaks by aerial application. One pound acid of a low volatile ester of 2,4,5-T, or 1½ pounds acid of 2,4-D and 2,4,5-T in 1 gallon diesel fuel and 3 gallons water per acre, gave over 50 per cent kills of plants under 6 feet tall. The applications were made during the first part of June in Central Texas.

Shinnery oak in Oklahoma has not been controlled effectively by application of 2,4-D or 2,4,5-T with ground or airplane spraying equipment. Top kills of 90 per cent were obtained and grass production was visibly increased, but root kills were considered inadequate.

Salt cedar or western tamarix has not been controlled effectively by aerial spray application of 2,4-D and 2,4,5-T in Western Texas.

Basal Application

THIS treatment consists of spraying the lower 12 to 18 inches basal portions of plants with 2,4-D, 2,4,5-T and mixtures of these chemicals. Excellent top kills of most woody species have been obtained during the growing season or in dormancy, but root kills have been less consistent. The greater variation in root kills is probably due to the variation of different species in the location, depth and nature of sprouting tissues below ground level. For effective control of woody plants, the entire basal area at the ground line encircling the plant should be wetted to the point of runoff. Diesel fuel, kerosene, or similar light oils have been superior to oil-water emulsions or water as diluents for basal treatments.

The ester formulations of 2,4,5-T at 8 pounds acid per 100 gallons of oil have generally been more effective, or equally as effective, as 12 to 16 pounds of 2,4-D or mixtures of 2,4-D and 2,4,5-T.

Basal applications have generally been highly effective for the control of black oak, southern red oak, Mohr's shin oak, intermediate on post oak and white oak, and least effective on live oak and blackjack oak. Common persimmon, mesquite, osage orange, sweetgum, huisache, black willow, smooth alder, hawthorn, hickory, chaparral, poison ivy and numerous other species have been controlled satisfactorily with basal applications. For large trees, effectiveness of the treatment may be improved by making notches around the base of the plant to expose the sapwood.

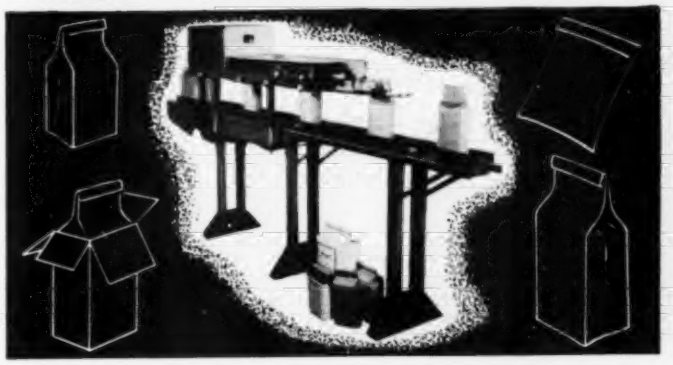
Cut Surface Treatments

THESE application methods include frilling, notching, cupping and stump treatments which generally give effective control, especially for larger trees. For the control of thin stands of undesirable plants in forest plantations and other similar sites, these methods are often economical and feasible; but in dense stands of brush over extensive areas, costs are usually prohibitive.

For treatments that require the application of chemicals only to the cut surfaces such as frills, notches, cups or the sapwood of stumps, "Ammate" as crystals or in 4 to 8 pound water solutions per gallon has given good control of woody plants. Similar concentrated solutions of 2,4-D and 2,4,5-T containing ½ up to 4 pounds acid per gallon, have given highly effective control with a minimum amount of material. For most effective control of sprouting shrubs, the cups, notches, and frills must be spaced not over 2 to 3 inches apart uniformly around the stem of larger trees. These rather concentrated solutions and emulsions appear most effective when water is used as a diluent.

For chemical treatment of cut surfaces, where it appears feasible to treat the cut surfaces, remaining bark and the basal area around the tree,

FRY BAG SEALER



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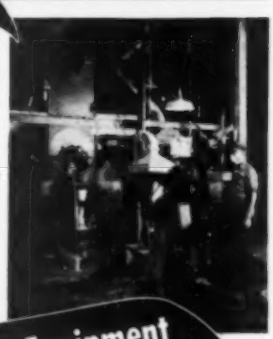

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SPROUT-WALDRON

INTIMATE BLENDING

353

2,4,5-T ester in oils appears superior to 2,4-D or mixtures of 2,4-D and 2,4,5-T for most species. The amount of 2,4,5-T acid in the ester form for good control with this type of application may be reduced to 10 to 20 pounds per 100 gallons of oil.

SOIL INSECTICIDES

(*Continued from Page 47*)

to 95.8% in June 1950 for the 5lb. per acre plots. The wireworm damage to lima bean plants was 0% for both treatments in 1950 and only 2% and 1% in 1951.

At both dosage levels the materials was still effective two years after application.

In the laboratory, soils which had originally been treated with 1, 3 and 5 pounds aldrin per acre were infested with wireworms 9 and 147 days following treatment.

The data show the loss in toxicity to wireworms following these intervals of weathering and exposure. Counts on these plots are to be continued once a year until the chemicals no longer affect wireworms.

At the Pineapple Research Institute of Hawaii, aldrin at 1¼, 2½, 5 and 10 pounds per acre gave 97%, 100%, 100% and 100% control of Anomala grubs at the end of 5 weeks. At the end of 12 months the figures reported were 73%, 69%, 100% and 100% for the same soils. At the Agricultural Experiment Station in Puerto Rico soils treated with aldrin at 2 pounds per acre retained their toxicity to white grubs into the second year.

Effect on Beneficial Organisms. In a summary of tests with residual soil insecticides at the Oregon Agricultural Experiment Station, it was reported that the bacteriologists indicated no detrimental effect to soil organisms, or earthworm populations, by the application of 10 pounds aldrin per acre. At Manhattan, Kansas, 5½ pounds aldrin per acre caused no adverse effects on nodule formation in soybeans which had previously been inoculated and planted on treated soils.

Deleterious Effects on Plants.

Off - flavor. When off - flavor in potatoes first came into prominence following BHC soil treatments, government inspectors were at a loss as to how to handle the matter. There was nothing in the regulations which covered foreign flavor and a large volume of potatoes were sold in full knowledge of the fact that they were not edible. It soon became apparent, however, that no amount of official sanction could sell off-flavor potatoes, and compounds which have since been developed for soil pest control have been carefully scrutinized in this one respect more than in any other.

Aldrin, unlike BHC, has an unusually clean slate as far as off-flavor is concerned. It has been tested extensively over a wide area and there have been no cases in which a crop grown in treated soil has been adversely affected in this one, all-important factor. At 100 pounds per acre, no foreign taste or objectionable flavor could be detected on any of the test crops in Kansas. In Oregon, food technologists observed no off-flavor in crops grown in 10 pounds aldrin per acre. The only offensive materials were lindane and BHC. Potatoes receiving 5 and 7½ pounds aldrin per acre in Canada were free of off-flavor. Peanuts in Virginia were free of foreign flavor at aldrin dosages of from 2 to 5 pounds per acre. The same general report, on a wide variety of test plants, has come from Experiment Stations in Honolulu, Pennsylvania, New York, Florida, Washington, California and elsewhere. These determinations, in most cases, are made by official taste panels. One of the leaders in this particular field is the Foods and Nutrition Department, College of Home Economics, Cornell University. They have been at it a long time and their opinions are as reliable as any in the country.

Translocation. Translocation is usually associated with a group of compounds, referred to as systemics (octamethyl pyrophosphoramide and others), which are readily taken up by roots and leaves and transported and stored in other parts of the plant. Chemical and biological assays were made in Manhattan, Kansas on crops growing in aldrin treated soil and no aldrin was found in the edible portion.

In California, tomatoes were grown in soils treated with 1, 3 and 5 pounds per acre of aldrin and the fruit analyzed chemically 5 months after treatment. No aldrin was absorbed and translocated by the plants.

There seems to be no doubt but that aldrin, like DDT, chlordane, toxaphene, BHC and many others is not taken up by plants growing in treated soils, even in cases of extreme and deliberate overapplication.

Residues. This is, by far, the most improtant consideration from the standpoint of regulatory officials. The biggest stumbling block in the whole field of pest control has always been the uncertain importance ascribed to residues when they occured. Fortunately, there has been some de-

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tailed work done with regard to residues occurring on crops grown in soils treated with aldrin, so we have already observed its lack of above-ground plant parts.

From tests made on various soil types in widely separated experiment stations, the indications are that there is little risk involved when aldrin applications are applied to the soil for soil pest control. The tolerance requested of the FDA by Julius Hyman & Co., is 4.00 parts per million.

In conclusion, it appears that aldrin has sufficient supporting evidence that if growers believe it advantageous to incorporate aldrin with fertilizer, there is no evidence available to indicate they should not be allowed to do so.

WEED CONFERENCE

(*Continued from Page* 41)

technology and research have already lifted agricultural production efficiency to a high point. In 1951, a little over 10 million agricultural workers were feeding the 155 million people in the U. S., as well as providing for a heavy export program. This was done at a ratio of one agricultural worker producing enough for himself and more than 14 others. Only 20 years ago, the ratio was 1 to 10; and 50 years ago, 1 to 7.

Concluding his paper on "1952's Challenge to Agricultural Research," Dr. Shaw declared that even with this progress, the pace is not fast enough to keep up with the long-term population needs. He said that the population of the U. S. is increasing at the rate of 2½ million persons each year. The increase in farm production required in 1952 is about 6% over last year's relatively high output, he said.

With very little additional land yet to be put into cultivation this year, the problem cannot be solved by adding new acreage, since there is only 2% increase possible by this means. The balance of the needed increase must come through use of present knowledge to increase farm efficiency, he declared.

G. M. Shear, Virginia Agri-

cultural Experiment Station, and president of the Southern Weed Conference, was chairman of the first general session at which Dr. Shaw spoke. Other speakers appearing on that program included L. E. Cowart, E. I. duPont de Nemours & Co., Baton Rouge, La.; A. W. Feldman and A. E. Smith, Naugatuck Chemical Division, U. S. Rubber Co., Naugatuck, Conn.; and E. B. Ennis, Jr. Mississippi Agri. Exp. Sta.

Cotton Problems Aired

DR. Ennis was chairman of the afternoon session which covered weed control in cotton. Speakers on this program represented largely the USDA and agricultural experiment station operating in the cotton states. These included M. M. Mayeux, Lawrence E. Creasy, Joseph L. Smilie, Russell Y. Ratcliff, and Wilbert C. Normand, Louisiana; John T. Holstun, Jr., O. A. Leonard, V. C. Harris and W. B. Ennis, Jr., Mississippi; and D. A. Hinkle, Joah S. Peek, Jr. and Francis Williams, Arkansas. C. M. Gates, Chapman Chemical Co., Memphis, Tenn., spoke on "Pre-emergence Weed Control in Cotton and Soybeans with Chloro IPC"; Godfrey L. White, Mid-South Chemical Co., Memphis, on "Weed and Grass Control in Cotton",

Others on the program that afternoon included J. T. Holstun, Jr., and O. B. Wooten, Jr., Stoneville, Miss.; H. E. Rea, H. F. Miller and H. P. Smith, Texas A. & M. College; Edward S. Hagood, Experiment, Ga.; and F. E. Edwards and V. C. Harris, Starkville, Miss.

Friday morning's program covered weed control in agronomic crops, with Vernon C. Harris, Starkville, Miss., as chairman; and the afternoon program dealt with control of woody plants. In charge of this section was L. E. Chaiken, Central Coastal Plain Research Center, Charleston, S. C. Speakers included representatives of the U. S. Department of Agriculture, state experiment stations and industry. Among the latter were L. H. Stevens, American Telephone and Telegraph Co., Richmond, Va.; E. F. Cottier, Pacific Coast Borax Co., Auburn, Ala., "Weed Problems in the Industrial Field"; Mark B. Weed, E. I. duPont de Nemours & Co., Inc., Wilmington, Del., "Weed and Brush Control in Industrial Areas"; and Frank E. Egler, American Museum of Natural History, New York.

The final session, held Friday afternoon, was concerned with horticultural crops and special weed problems. It was under the chairmanship of W. C. Shaw, U.S.D.A., Washington, D. C.★★

SHADE TREES

(*Continued from Page 37*)

year. Mr. Shield, head of the Shield Shade Tree Specialists, operating in the St. Louis area, succeeds Alfred F. Carlstrom of the Chicago Park district, who was retired to the Chapter's Board of Governors.

New vice president is George Kelly, executive secretary of the Colorado Forestry and Horticulture

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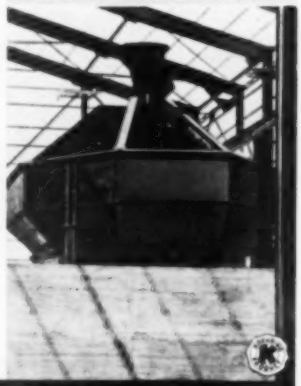

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Association, Denver, Colo. Noel Wysong, chief forester, Cook County Forest Preserve, Chicago, was continued as secretary-treasurer. New members of the board of directors, elected to fill expired terms of others, are C. I. Baker, landscape construction supervisor, Chicago Park District, and Richard K. Allman, city forester, Cedar Rapids, Ia.

Denver, Colo., was chosen as the place for the Midwest chapter's 1953 meeting at a date to be announced later. The National Shade Tree Conference will hold its 1952 meeting next Aug. 18 to 22, at the Hotel Statler, Boston, Mass., and its 1953 meeting in Chicago.

COTTON STATES

(Continued from Page 40)

floor revealed that Louisiana farmers continue to get some off-flavor from certain insecticides when crops are grown on the soil in following seasons. Another comment was to the effect that in South Carolina, insecticides found in the soil were less in quantity than the amount originally applied. Since the reduction was greater than would normally be brought about through decomposition, studies need to be made into the fate of the toxicant in soils.

Another angle of controlling soil insecticides was that of knowing the species of wireworm involved. Some are easier to control than others. If several species are present, it is then necessary to determine which one is doing the actual damage. Since sometimes the minority is causing more harm than the more numerous pest, effort must be made to control the one found to be doing the most damage. Getting the insecticide into the soil in time to control the younger pests is more effective than waiting until the insect is more mature and difficult to kill.

It was also pointed out that insecticides in South Carolina, at least, have not damaged soils so that subsequent crops cannot be grown.

O. I. Snapp, Ft. Valley, Ga., presided at the Tuesday afternoon session which consisted of technical

paper presentations. J. H. Cochran, Clemson, S. C., told about tests with organic phosphate dusts for control of plum curculio. He said that eight organic phosphates were tested in the laboratory as dusts containing 1.5 per cent of the active compound on the adult plum curculio. EPN and the dimethyl analog of parathion were more effective than parathion or "Compound 4049." The other four materials were much less effective. Also, laboratory tests indicated that sulphur does not increase the effectiveness of parathion or EPN dusts; and parathion-sulphur dusts can be stored for one year in the original shipping bags without losing their effectiveness, but dusts stored for two years lost part of their insecticidal properties.

The entomologists' banquet was held Tuesday evening, with a program of entertainment following the dinner. Dr. Snapp acted as master of ceremonies for the evening.

The final morning session on February 6, was in charge of Dr. Alden. J. K. Reed, Clemson, S. C., discussed insecticides in the soil as determined by bio-assay; W. M. Kulash, Raleigh, N. C., described field and laboratory tests for controlling wireworms in field corn; and E. H. Floyd, Baton Rouge, La., presented results of soil-treatment tests with chlordane for control of the sweet potato weevil.

Dr. Floyd reported that over a four-year period, chlordane as a soil treatment was found to be partially effective in protecting the tuberous roots of sweet potatoes from infestation by the sweet potato weevil. Such control was not perfect, but compared favorably with calcium arsenate applied to the growing crop. Also an improvement in the appearance of the potatoes in chlordane-treated plots was noticeable compared to the untreated plots, he said. (This improvement in appearance was probably due to prevention of damage by white grubs and possibly other soil-inhabiting insect species. No off-flavor has been detected in potatoes grown in chlordane-treated soil, it was reported.

At a business meeting at the end of the Wednesday morning session, the new officers were announced, and reports were heard. A discussion regarding a possible change of name for the Cotton States Branch brought out numerous ideas for different names, some of the members expressing doubt that the present name is comprehensive enough to cover the broad studies carried out by the group. No decision was made, the matter being referred to the executive committee for consideration.

FUNGICIDES

(*Continued from Page 71*)

one month. At the end of two and three months, no positive cultures were obtained from either spore scrapes or wood platings. Most of the fungus growth on the end-racked boards was on the end nearest the

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ground, the other end being relatively free of subsequent fungus growth.

At the end of one month, the boards that were either bulk-piled or sticker-piled green yielded 60 percent positive cultures from spore isolations. Neither of these treatments yielded the fungus from spore cultures at the end of two months, or from spore or wood cultures at the end of three months. All of the boards in these two treatments were heavily covered with black mycelial growth of the fungus soon after the experiment started.

To summarize, lumber piling methods that might be used by southern sawmills were employed to determine the length of time spores and mycelium of the causal fungus would remain viable in lumber cut from sugar-maple trees affected with sapstreak. Spraying the boards with "Permatox 10-S" prevented the development of spores and mycelium on the surface of the infected boards. Kiln-drying killed both the spores and mycelium. However, the time that elapsed between cutting and kiln-drying in these tests permitted the development of heavy discoloration, due to the fungus, on the exterior of the boards. End-racking, while not preventing the development of external stain, greatly reduced it, the stain being confined to those portions of the boards closest to the ground. Bulk-piling and sticker-piling of green boards permitted entire boards to become heavily stained. Spores and mycelium of the fungus did not live as long as two summer months after the logs were cut into lumber, regardless of how the lumber was treated. Adequately seasoned or fungicide-treated sapstreak lumber can safely be shipped into other sugar-maple-producing areas with little danger of spreading the disease.★★

CONDITIONERS

(*Continued from Page* 55)

alone does not insure maximum conditioning value. Extremely lightweight materials, such as expanded perlite with an apparent density of 4 pounds per cubic foot, tend to increase segregation in the mixture.

While segregation is controlled in the laboratory tests, it is not as easily controlled in commercial practice and may reduce the effectiveness of the conditioner. The use of light-weight conditioners also increases the bulk of the fertilizer. For example, 5% of expanded perlite increased the bulk of the mixture by approximately 25%. Combinations of such inherent properties of conditioners are responsible for their relative efficiency. None of the materials tested appears to have properties that insure elimination of caking under the variable conditions encountered in commercial practice.

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vided active ingredients, and (c) maintenance of low moisture content in the mixture.

Enlargement of the particle and drying of the product are essential steps in the granulation of mixed fertilizers and tend to reduce caking. The tendency of finely-divided particles of the active ingredients of a mixture to react and knit together in the presence of moisture is used to advantage in the granulation process. Thus, granulation seems to be the nearest approach to solution of the conditioning problem in mixed fertilizers. Coating of granular products with inert powdered conditioner has been a reasonably satisfactory means of conditioning such hygroscopic materials as granular ammonium nitrate.

Summary. Some 1400 laboratory caking tests on mixed fertilizers, with and without the inclusion in the mixture of 54 different conditioning agents, showed that initial moisture content is the principal factor governing caking. Unconditioned 10-10-10 mixed fertilizer, having a particle size of 0.246-0.279 mm. (50-60 mesh) and containing 4.3% initial moisture, produced a cake with a crushing strength of 240 p.s.i. This value was selected as the standard of reference. A change in the type of superphosphate used caused a 22% reduction in the crushing strength of the cake. Decreasing the initial moisture content to 1.5% eliminated caking. Conditioning agents used at the rate of 100 pounds per ton of final mixture, decreased the crushing strength of the cake up to 83% depending on the type of conditioner used. At the rate of 400 lbs. per ton the most effective conditioners decreased the crushing strength 97%. Inert conditioners, having the same particle size range as the fertilizer, reduced the crushing strength up to 83% when used at the rate of 100 pounds per ton, and the percentage reduction in crushing strength was independent of the moisture content of the mixture. Inert powdered conditioners varied in their ability to coat the fertilizer particle, and, within limits, their coating efficiency as well as their conditioning efficiency decreased with an increase of the fertilizer's moisture content. An increase in particle size of the fertilizer ingredients from 0.25 mm. to 1.65 mm. reduced the crushing strength of fertilizer cake 62%.

One percent of magnesium oxide in the reference mixture was a more effective anti-caking agent than 5% of most of the inert conditioners tested. The use of small amounts of urea in the mixture appeared to modify the structure of the fertilizer cake and reduce its crushing strength. In general, the inclusion of such materials in the mixture, as well as use of coarse active ingredients, and the maintenance of low moisture content, are important factors in the consistently successful use of a conditioning agent.

Acknowledgment

The authors wish to thank the members of the fertilizer industry and the producers of some of the

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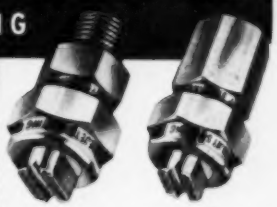

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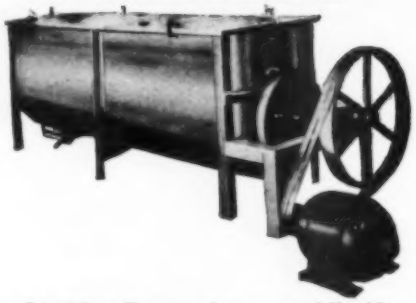

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conditioning materials who kindly cooperated in supplying samples for these tests; also, the Eastern States Farmers' Exchange, Inc., for conducting the plant scale tests.

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ENTOMOLOGIST

(*Continued from Page 51*)

writer by the federal government, was a bicycle! Later a motorcycle became the means of getting from here to there, but the writer failed to develop any bond of affection for this tricky two-wheeled affair.

Despite the indifference of much of the public toward the profession of entomology in those early years, one group of people, the farmers, were gradually becoming aware

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of the insect specialist's importance. The agriculturist was beginning to realize that the entomologist had a great deal to offer in reducing the increasing annual losses to the depredations of bugs. The boll weevil was spreading rapidly, and no good control method was available. The Gypsy moth was about the only insect under quarantine, and the Japanese beetle and Oriental Fruit moth were discovered in 1916. With these added insect hazards, it was natural for the farmer to look for some means of halting these threats.

Paris green was the main insecticide in use at this time, although lead arsenate was beginning to supplant it. Lime sulfur was the dormant spray material in general use. In keeping with the lack of general knowledge of entomological science, both state and federal appropriations for insect control and research, were either meager or non-existant. However, the American Association of Economic Entomologists was established and under way, although having but a small membership. Its official publication, *The Journal of Economic Entomology*, had been published for about seven years. The number of entomologists has increased from around 300 in those early days, to more than 5,000 today. And we regarded the field as crowded in 1915!

But of course with the development of any science or profession, problems accompany each step forward. Today, these problems are many in number, but are being solved one at a time. Although a barrel pump was considered the last word in 1915, entomologists now have a wide selection of greatly improved application facilities including high pressure spray tanks, jeep and turbine blowers, power takeoffs, airplane sprayers and dusters and numerous specialized devices for ground spraying and dusting. These mechanical developments have been necessary adjuncts to the tremendous number and variety of insecticides introduced to agriculture during the past few years, for better control of crop pests.

And, of course, along with the scientific advancement has come a vast betterment in the position of the entomologist himself. More are now employed under civil service with attractive retirement benefits, and an increasing number are being retained by industry in connection with the development and testing of new pesticides.

All in all, it is an encouraging picture. The past thirty-five years have proved to this writer that the science of entomology is not only here to stay, but is bound to be more and more important in the affairs of men and nations. The control of crop-destroying insects has an economic, political and social bearing of world-wide importance. The job still uncompleted, is to expand the science to cover areas so far untouched by entomology, and to direct the public's attention to the benefits it enjoys through the work of the entomologist. These objectives accomplished, the science of pest control will move ahead at an even faster pace!

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'52 Insecticide Supply Good

With the exception of pyrethrum, most of the materials used in the manufacture of insecticides are in good supply, according to a recent report by the National Production Authority at a meeting of the Household, Industrial and Dairy Insecticides Industry Advisory Committee in Washington, D. C.

Present plans are to maintain pyrethrum stocks at their present level, but it has not been necessary to continue purchases of pyrethrum over the past year. The availability of allethrin is said to have made it possible for the government to discontinue stockpiling.

•

Am.Potash Names Pritchard

John O. Pritchard has been appointed head of the new process evaluation division of the research department of American Potash & Chemical Corp., New York. Mr. Pritchard was formerly with the engineering department of E. I. duPont de Nemours & Co., Wilmington and for a number of years served as a field engineer in process and development groups. For the past three years he served as a production supervisor at the Grasselli Chemicals Department plant of duPont at E. Chicago, Ind.

•

Bemis Elects Two

Bemis Bro. Bag Co., St. Louis, has recently elected to its board of directors, C. W. Loomis, vice-president and director of personnel and named F. V. Deaderick, eastern director of sales, vice-president.

Mr. Loomis has been with the firm for 36 years, having started as a clerk in the company's Boston office upon graduation from Massachusetts Institute of Technology. He was made a vice-president in 1947.

Mr. Deaderick joined Bemis in 1918 at St. Louis. He served as salesman and later as office manager at St. Louis and in 1927, became manager of the Bemis plant at Houston, Texas. Last year he took over the newly-created post of Eastern Director of Sales.

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TALE ENDS

OF all places, New York City has an organization of farmers, believe it or not! To be sure, they are gentlemen farmers who supplement their income from farming by various other pursuits at which they slave day by day in the big city. But, nevertheless, they are farmers. They meet once a month, some 100 or so of them, at the Hotel Shelton, New York, for lunch and to hear a speaker on some farm subject. Last month, for example, Prof. Richard Bradfield, head of Cornell's Department of Agronomy spoke on soil conservation. This group is known as the Farm Club and they operate farms all the way from Georgia to Maine and west as far as Iowa.

* * * *

The following "Creed" for fertilizer salesmen was sent to AGRICULTURAL CHEMICALS by R. L. Luckhardt, manager, Agricultural Advisory Service, Agriform Co., Inc., E. Centro, Calif. The "creed" has been circulated throughout the Agriform organization, Mr. Luckhardt says.

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(by a fertilizer salesman)

YOU CAN'T KID A CROP. Fertilizer is essential to agricultural production in our area. One may hoodwink a customer, fool one's own self, cut your own commissions, reduce the company profits, cheat your co-workers, and be a traitor to your industry, but you CAN'T KID A CROP. If we sell the best plant food at the right time, with the correct placement, and in sufficient amount, the results are so generally favorable as to make honesty our most profitable policy and truth the most effective selling tool.

TO UNDERSELL IS A CRIME at least as serious as to oversell. The grower has a gambler's chance of making money on high fertility; but we cheat him of a chance to try when we undersell. To be misleading, or permit others so to lie, regarding the quantity of plant food sold, is a crime. To not sell enough in one application to overcome fixing capacity of the soil, is to cause waste, dissatisfaction, and financial failure. If we don't have the product on hand which the customer needs, call in the competition—unless we are scared of them—in which case we shouldn't be in business.

IGNORANCE EXCUSES no one from the facts of life, including the necessity of adequate plant food. For the business success which we desire it is essential that we know as much as possible about our plant food products: their formulas, quantity, timing, and placement. Where information is lacking, let us take the sure road to success and admit we don't know.

HONESTY ISN'T JUST THE BEST POLICY: IT'S THE ONLY ONE FOR HAPPINESS, PEACE OF MIND, AND BUSINESS SUCCESS.

That, friends, is My Creed and by it, I shall dare to do business.

Drill!

AGAIN, and again, and again. Just like the kind of advertising that pays off in the long run, — regular advertising month in and month out, again and again and again.

And the kind, for example, that can pay off well in the field of insecticides, fertilizers, fungicides, herbicides and other chemical specialties, are the ads in

AGRICULTURAL CHEMICALS

175 FIFTH AVE. NEW YORK 10, N. Y.

NO. 4 OF A SERIES

ON HOW TO

Stretch a MULTIWALL Paper Bag

Kraft paper supplies are short. So it is important for you to get the best use from your multiwalls. Here are a couple of good ways to stretch them . . .

USE THE EXPERIENCE OF BEMIS SALESMEN AND SERVICE MEN

From installation of equipment to car-loading, Bemis men can often give money-saving help. Here is an actual case:

A mill complained that multiwalls were breaking going through the bag flattener. A Bemis Salesman found that—

1. The chute from the valve packer was too steep. The bags hit the flattener rolls too fast.
2. An obstruction in the chute made small cuts in the bag.
3. The guide rails were too far apart so some bags entered the rolls on the diagonal.

The causes of trouble were eliminated . . . everybody benefited.

USE A BEMIS SEWING MACHINE CLINIC

These clinics are informal instruction periods conducted by specially trained Bemis experts for plant personnel who supervise and use bag closing sewing machines. There are demonstrations and discussions on sewing machine operation and maintenance. Motion pictures show efficient installations, the dismantling and reassembling of sewing heads, etc.

Bemis specialists also assist in planning production line changes . . . and they will recommend new types of equipment, describe latest methods, or help you with special packaging problems.

Want the Whole Story?

Ask your Bemis Man for a copy of the illustrated Bemis Multiwall Packing Guide. It deals with Storage, Filling and Closing, Handling, Palletizing and other important subjects that will help you make your multiwall bags serve you better.

• • •

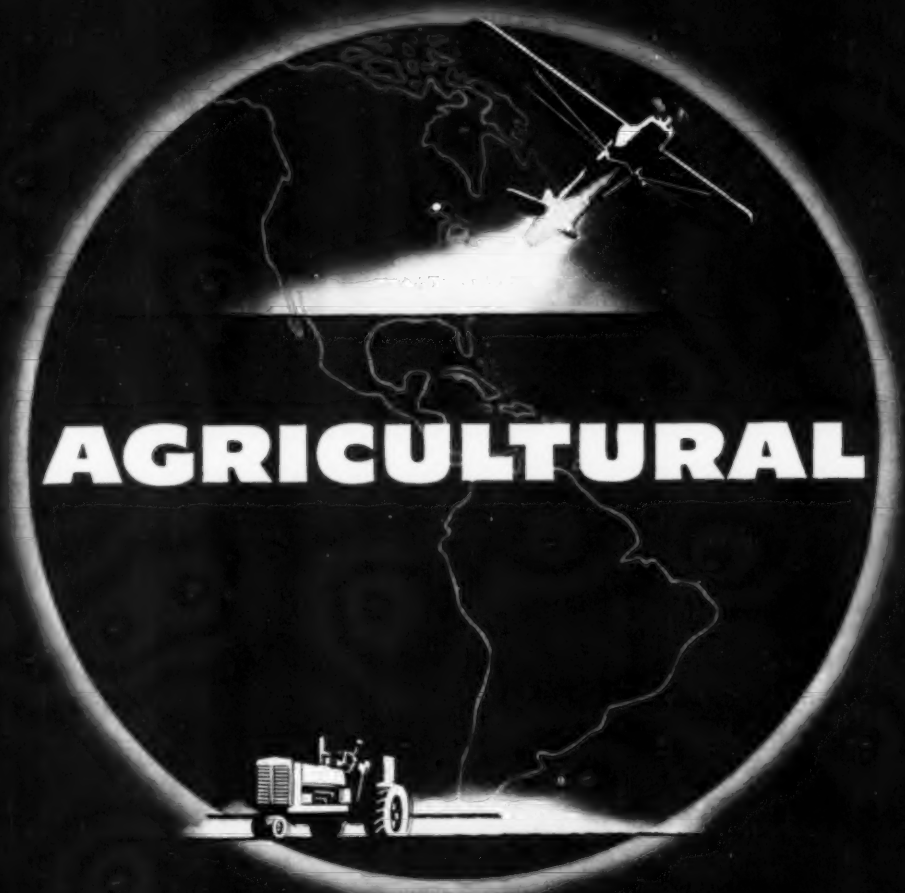
Maybe Cotton Bags are Your Answer . . . if you can't get all of the multiwalls you need. Cotton bags are available . . . and Bemis is the leading cotton bag source.

Bemis

BEMIS BRO BAG COMPANY

St. Louis 2, Missouri

TOXAPHENE



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